AVIATION

The Oldest American Aeronautical Magazine

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VOLUME XVII

NUMBER 22

SPECIAL FEATURES

OPINIONS ON AIR LEGISLATION

N. Y. WORLD PROBES U. S. AIR SITUATION

PROGRESS OF CIVIL AVIATION IN ENGLAND

PHOTOGRAPHIC MEASUREMENTS IN AERODYNAMICS

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Dr. Eckener on Airships

BEFORE leaving for Germany, Dr. Hugo Eckener, president of the Zeppelin Company and commander of the ZR-3 on her flight to this country, made certain observations that will be of interest to those concerned with commercial airship operation.

He is reported to have said that he did not think the airship would ever supplant the steamship for trans-Atlantic travel. He thought that airships would not be large enough to take care of this traffic and that a large number of persons liked the sea trip so well that they would not want to change to the air trip for the sake of a few day's saving of time. This argument held true in the days of sailing vessels just as it does today. Only the future can tell.

While he was enthusiastic over the ZR-3's ability to go anywhere through all kinds of weather, Dr. Eckener also said:

"I doubt whether the ZR-3 can be put to this use if helium gas continues to replace hydrogen. Helium is safer, but it is not so economical as hydrogen, which really is imperative in the case of the ZR-3, as far as flights across the Atlantic are concerned.

"Helium has not the lifting power of hydrogen. When we sailed from Germany the bag was filled to capacity and the load limited to a minimum. We were able to carry thirty tons of fuel. If helium had been used we would have been able to carry only twenty-two.

"When we landed in Lakehurst we had six and a half tons of fuel left. Had helium been used, the fuel carrying difference would have meant the difference between success and failure.

"Then, too, helium is much more expensive and I doubt mail trips could be made practical with its use."

Such words of caution are timely when there is so much propaganda being spread regarding the advantages of helium over hydrogen.

While the fire proof properties of helium may have some value for military operations in wartime, inasmuch as it would lessen the risk of an airship being set on fire by incendiary bullets, it should be kept in mind that even a helium filled airship presents a serious fire risk as long as it carries tons of highly inflammable gasoline on board. The real answer to the problem is the development of heavy oil engines for airship use. In this connection it is of interest to note that one of the two 5,000,000 cu. ft. rigid airships that were recently ordered by the British government will be equipped with crude oil engines. The outcome of this experiment will be watched with great interest by all proponents of the airship.

Sanctioned Meets and Acrobatics

NOW that the coming of winter cuts short flying activities in the northern latitudes and gives the aeronautic fraternity time to ponder over the credit and debit sides of the past season, it seems timely to question whether it is wise to include in the program of sanctioned meets stunts of the wing walking variety.

The death of Mrs. Ruth Garver, an exhibition parachute jumper, during the Wichita air meet is still vivid in the memories of all who witnessed that tragedy. Now comes the news of the death in a cross-country flight of one of the best known wing walkers in the country, Clyde Horchem. In one case the parachute fails to open. It functioned countless times, but this time it did not. In the other case, the victim climbs out on the wing of a ship piloted by a youth who only has had four lessons in flying, the ship goes into a spin and the wing walker drops to his death. If national air legislation would do nothing else but prevent the occurrence of such totally needless fatalities, it would amply justify itself. In England, France and Italy—in fact in all the thirteen countries which are parties to the International Air Convention—such stunts are prohibited and the ruling is strictly enforced.

In the United States, in the absence of national aircraft regulation, the National Aeronautic Association could render valuable service to commercial aviation if its Contest Committee made it a point to refuse to sanction meets where aerial acrobatics are on the program.

Such a policy would be in line with the true purpose of air meets, which is not so much to amuse and to thrill the public with the "incredible" doings of airmen as to educate it to the safety of sane flying. If parachute jumps are included in a meet, they should be made with government inspected equipment, so as to give onlookers a practical demonstration of the aerial lifebelt's uses in an emergency. It may even be questioned whether parachute jumps help much to increase the public's confidence in flying. The crews of sailboats participating in a regatta don't jump overboard with lifebelts just to show the public how safe it is. One of them might get drowned by accident.

What we must endeavor to achieve if we want to sell airplanes to the public by the hundred and by the thousand is to take the spectacular end out of aviation. When the man in the street will have become convinced that no superhuman skill or intelligence is required to fly, and that with a tolerable amount of attention a modern airplane actually flies itself, then he will take to flying as he took to the automobile. But he will not do it before then.

Another Municipal Airport

DETROIT has now joined the rank of progressive cities that have made provisions for a municipal airport, as may be seen elsewhere in this issue. We wonder how long it will take our own city authorities to realize that the air terminal facilities of New York are totally inadequate.

Opinions on National Air Legislation

Do We Want Government Control of Civil Aviation? If so, What Kind?

The average person interested in aviation approaches as a rule the question of aeronautical legislation with a number of set opinions and prejudices which are not always based on accurate knowledge of the subject. The resulting clash of opinions has led to a much greater consideration and study of proposed legislation than would have been the case had there not been such violent differences of opinion, and many people who had taken much for granted have during the last year really studied the subject and put in much time and thought on the matter. In order to spread this knowledge AVIATION has written to a number of people prominent in the aeronautical world, asking them to express their opinions for the benefit of our readers. We will endeavor to present the matter impartially and in such a manner as to bring out the various points for and against legislation.

In Favor of Winslow Bill

Editor, AVIATION —

I thank you for your favor of the 25th, and the opportunity of stating the attitude of the National Aeronautic Association toward a Federal Legislation and the Winslow Bill in particular.

We are in favor of Federal Legislation and think that on the whole the Winslow Bill is a praiseworthy measure, but we wish to receive specific criticisms on any part of this measure from those interested so that we may cooperate to obtain the best possible Federal Law for the regulation of aeronautics.

The Constitution of the United States gives the Federal Congress exclusive jurisdiction over interstate commerce. It is peculiarly fitting that they should properly regulate a method of transportation in which the traveler is not unlikely to pass from one state to another ignorant as to what state he is flying over.

The speed of an airplane relative to the ground is an algebraic sum of its speed relative to the air and the speed of the air in which it is flying, relative to the ground. If now, the ground is concealed by clouds or greatly obscured by haze, the aviator is ignorant of the speed and direction relative to the ground over which his plane is progressing and consequently liable to great errors in dead reckoning, even if accurately estimating the direction and speed at which he is traveling relative to the air.

The second most important end of Federal Legislation is to prevent all incompetent pilots from going into the air at all and thus compelling all pilots to make themselves competent or to go into some other business.

The necessity of this is, in the first instance, to give all who wish to travel or send their wares through the air a Government guarantee of competent care, and secondly, to give those beneath a reasonable assurance of protection from careless aviators above.

There is, however, a third purpose and result of this particular regulation that should be particularly emphasized at the present time, and for the reason that it will, if properly weighed, remove nine-tenths of the present opposition to the provision as to pilots, viz.—the effect of this provision on the air pilots of this country and adjoining lands that may wish to fly over our territory.

In the first place we are doing for this guild, (if we may so name them) one of the most important and valuable functions that labor organizations do for their members, viz.—protect them from irresponsible competition which tends to unduly depress the rate of pay and degrade the wage earner.

Furthermore, contrary to the usual result of the restrictions imposed in the interest of organized labor, in this particular instance the result cannot fail to be an immensely increasing demand for the services of pilots, and for the reason that the amount of flying done in this country is not and will not in the near future be chiefly conditioned by expense. It is and will be for many years to come chiefly conditioned by safety and convenience and confidence of the flying public and of those who might become air passengers in the safety of the method of transportation.

The next function in importance of such a law is to provide for the inspection of airplanes so that no unsafe plane will be allowed in the air. The argument for this is precisely similar to that of the licensing of the pilots. It will greatly increase the number of airplanes that we have in this country and also appreciably increase the selling price by compelling a proper standard of quality.

It must, therefore, benefit all conscientious and competent aircraft manufacturers. Those competent pilots who may be compelled to give up independent flying because of their inability to pay for a safe machine and for its maintenance in a condition of safety, will presently find themselves incomparably better off financially by reason of a great demand for competent pilots.

GODFREY L. CABOT
President National Aeronautic Association of U. S. A.

Massachusetts Experience Favorable

Editor, AVIATION —

At the outset I desire to state that my opinion is based solely on the experience that we have had with air legislation in this vicinity and a thorough knowledge of conditions in another section of the country might considerably modify my attitude.

We have an excellent air law in Massachusetts, providing for the inspection of aircraft and the licensing of pilots, and also providing certain regulations in regard to a minimum altitude over cities, etc. A somewhat similar law is in operation in Connecticut, Vermont, and Maine. The Maine law was enacted at the urgent request of one of the most experienced commercial pilots in the country, and last year a commercial pilot operating several planes for passenger carrying and exhibition work in New Hampshire sent to me for a copy of the Massachusetts law and asked for help in having a similar law passed in New Hampshire.

As Professor Warner was quoted in the Convention issue of AVIATION, during the four years that the Massachusetts law has been in force only four fatal accidents have occurred in the state. Two happened with aircraft which had not been registered, the third involved a pilot who had been warned by the State Aircraft Board to discontinue trick flying and in the fourth case an incompletely trained student was the victim.

The Massachusetts law seems to meet with the universal approval of the pilots. At least as Chairman of the Municipal Air Board, a Governor of the National Aeronautic Association and an officer in two Aero Clubs I have never heard a complaint or a grumble from a pilot in regard thereto, and it is my opinion that some sort of a federal law providing for the inspection and registration of aircraft and the examination and licensing of pilots would be the biggest single boon to the promotion of commercial aviation and I think that every pilot who opposes federal legislation is tremendously delaying his own prosperity.

It is a generally admitted fact that lack of public confidence is responsible for a majority of the difficulties in establishing and operating successful air lines, and no single thing will so quickly give the public confidence as the knowledge that the planes have been government inspected and approved and that the pilot has been tested and certified.

I hold no brief for the Winslow bill, I don't claim that it is the best bill we can get, and it may not even be a good bill, but right now it seems to be about the only bill that we have. Either let's get another bill quick or pass the Winslow bill because in my opinion some form of Federal Air Legislation is badly needed to help commercial aviation and I believe that once we have a start any good bill can be changed as found necessary.

There has been considerable talk against the Winslow bill. Whether that has been based solely on the Winslow bill or whether the same feeling will exist against any bill is difficult to determine. Also, the basis for this feeling has been difficult to ascertain, and I hope that your investigation will bring out in cold type the true causes for this feeling. The fact that a man is opposed to Federal Air Legislation because he has an unsafe plane which he knows would be condemned by competent authority should be taken no more seriously than the opinion of a murderer who is opposed to capital punishment.

To sum up: We have an air law in Massachusetts. It has done no harm, it has done much good, and it is liked by all aviation interests. In other New England states where an air law is not in force, it is the pilots themselves who are most anxious to have one enacted. The feeling here is that it is a distinct advantage to a pilot to be able to assure his passenger that his ship has state approval and that he has a state license. I have yet to meet a responsible pilot who has anything but praise for air legislation as it exists in Massachusetts.

PORTER ADAMS
Chairman, Municipal Air Board, Boston

Simple Regulations Wanted

Editor, AVIATION —

Aeronautics, like every other private enterprise or civilian means of transportation, should receive a minimum amount of legislation necessary to make it safe, dependable and worthy of public confidence. Government control is already seriously interfering with the course of other industries and there will always be danger of too much Government control of aviation.

In my opinion, the aeronautical legislation needed is very simple and should consist of:

1. Regulations to assure that every airplane or airship which flies is airworthy and safe to carry passengers at all times.

2. Regulations assuring that all pilots of airplanes and airships are competent to handle the type of machine which they wish to fly.

3. Air traffic regulations containing ordinary common sense rules of navigation. These should be simple and few in number.

4. License cards for pilots and numbers or letters for machines so that they can be easily identified at all times.

With regard to the Winslow Bill, it seems to include most of these provisions, and while it is intricate, as is every piece of legislation which comes from Washington, and while the means of administrative control may not be ideal, I consider from my present knowledge of its provisions, that it is the best bill we may hope for at the present time and believe it should be passed at the earliest possible moment.

WALLACE KELLETT
Lenr & Maurice Farman Aeroplanes, Philadelphia, Pa

Any Law Better than No Law

Editor, AVIATION —

Confidence is necessary if any business is to be successful, and the lack of confidence displayed by the public in aviation most certainly is one of the chief reasons why air transportation has not progressed more rapidly in this country since the war.

People are not all foolish; they realize that any would-be pilot can now purchase any junk airplane and carry passengers and not be interfered with by the law—there is no law. They have seen designers send up airplanes which if there had been a law would never have gone in the air and have read of the death of some friend or acquaintance because of a foolish stunt performed by some pilot in a machine not designed for stunting and they know there is no law to prevent a recurrence of such an accident. Investors hesitate to put money in something in which the public has no faith, which is not protected by law, and hence the industry stands still and tries to get Congress to give it money.

Any law is better than no law. The Winslow bill has been worked on for some time by all the agencies interested in aeronautics, it must have good points, it probably has flaws, but neither its good points nor flaws can be remedied by talk. My thought is to put the law into operation in the least possible time and let those affected work out bad points. We certainly need a law and need it quickly.

PAUL G. ZIMMERMANN
Aeronautical Engineer, Keyport, N. J.

Against the Winslow Bill

Please note the following four constructive points concerning the Winslow bill:

1. The past forms of the Winslow bill have been thoroughly un-American, bureaucratic, and unconstitutional. There will be less opposition to it if it will limit itself strictly to what the national government is authorized at present by the Constitution to control, interstate commerce. Let's stand by the Constitution.

2. The control of the air should be lodged in a body constituted and appointed as is the Interstate Commerce Commission. This form is more or less approved by experience and will better approximate as fair and democratic a control as can at present be attained.

3. The Oct. 20, 1924, issue of AVIATION contains reference to three reports by the National Advisory Committee of Aeronautics, one based on the work of the Navy bureau, one on the work of the Bureau of Standards, and one paid for by the Army and the work done at Langley Field. The National Advisory Committee is costly, $450,000 per year, is extra legal, un-American, and an anomaly. It should be abolished and the work assigned to the Bureau of Standards where it belongs. There should be none of such bodies permitted under the new bill.

4. Heavy fines should be done away with, the vast detail of provisions for regulation provided in the present bill, and its autocratic spirit should be entirely omitted so that there should be entire flexibility to permit the adaptation of rules to the growth and the development of the science and the art. The country will allow only a little development of war aeronautics, and our defense must be provided by a strong civilian air force. Relegate the army to its own department.

WM. J. H. STRONG
Chicago Helicopters, Ltd., Chicago

Our Air Defense

The subject of the U. S. Air Service is said to be one of the most outstanding in connection with problems of National Defense, according to Assistant Secretary of War Davis.

While this country is considerably ahead of all foreign countries in quality of airplanes, that is for speed, altitude and reliability, practically all other nations are ahead of the United States in the number of planes available for military use. At present the policy of the U. S. War Department is to keep ahead of other nations in quality of planes, depending upon quantity production when the need arises, whereas some foreign nations must be prepared for the instant use of their air forces and therefore must sacrifice to some extent quality for quantity. This country should have 4,000 young men in training each year for the Air Service.

The training of enlisted men as pilots was also endorsed by the Assistant War Secretary.

The Air Defence of Great Britain

The British Air Ministry announces that Air Marshal Sir John Maitland Salmond has been selected to fill the post about to be created with effect from Jan. 1, 1925, of Air Officer Commanding-in-Chief, Air Defence of Great Britain.

The command to which Sir John Salmond has been appointed is a new command instituted in consequence of the scheme for the defence of the United Kingdom against air attack which was approved by the British government last year. It will be recollected that this scheme embraces the formation of fifty-two squadrons as a home defence force together with the necessary ground defences to be provided by the army, consisting of anti-aircraft batteries, searchlights, etc.

A New York-Chicago Night Air Mail Service

New Schedule, Wanted by Business, to Start Early Next Spring

Overnight Air Mail service between New York and Chicago, to start early next spring, was announced Nov 14 by Carl F Egge, General Superintendent of the Post Office Department's Air Mail Division Mr Egge has just completed his report to Col Paul Henderson, Second Assistant Postmaster General, embracing plans for illuminating the 780 mi. route and working out emergency landing fields

The Overnight Schedule

The time required for the flight westbound will be 9 hr. and the time eastward, 8 hr—due to prevailing winds. The fastest mail time between New York and Chicago is 20 hr. The mail planes will leave the New York terminal at 10:00 p m E S T and arrive in Chicago at 6:00 a. m., C S T They will leave the Chicago Terminal at 9:00 p m. C S T. and arrive in New York at 6:00 a. m. E S T. Delivery will thus be by the first carrier trip The postage rate will remain the same as for the present day flying—eight cents an ounce or fraction thereof

The present transcontinental service will be continued without change.

"We have completed four months of regular day and night flying between New York and San Francisco and our operations have been generally so satisfactory that we now feel confident we can fly on schedule by night over the Allegheny Mountains," Superintendent Egge said, announcing the new Air Mail schedule

Business Keen About New Service

"The present transcontinental schedule calls for departure from New York and Chicago, respectively, at 10:00 a. m. and 7:30 a m Arrival at each point is too late for delivery the same day Business houses, bankers, shippers, etc., finding the average of 32 or 33 hr flight from ocean to ocean of such great advantage, inquiries began to flood into the Department as to overnight service between New York and Chicago

"Colonel Henderson, in response to these requests, about a month and a half ago, instructed me to investigate thoroughly the practicability of operating at night over the Alleghenies. Our first efforts at night flying were confined to the level plains and prairie region between Chicago and Cheyenne, for to fly the Alleghenies presented many new problems. After a number of surveys both from the air and on the ground, I came to the conclusion that, while maintaining the same general route now followed, we could, by slight variations, north and south, lay out a night airway in what has hitherto been regarded as a mountain wilderness.

"Colonel Henderson at the same time instructed our Traffic Manager, Luther K Bell, to investigate the class of requests for overnight service, and his survey, conducted in both New York and Chicago, would seem to indicate that eight hour delivery would be appreciated by thousands of business men who daily carry on transactions of much financial, commercial and industrial importance between the two cities.

New Eastern Terminal

"Our first step has been taken While retaining our New York terminal at Garden City we leased a new field 5 mi. from New Brunswick This is known as Hadley Field It comprises 77 acres. It has the incomparable advantage of being free from the fog and smoke which is a handicap to air navigation close to New York, and is actually 50 mi. west of Garden City This means that on our transcontinental service, when winter darkness shortens the days, the mail can be safely and efficiently put down at Hadley Field. This new night terminal is 60 to 90 min from the New York General Post Office, and is reached by the fast mail trains of the Pennsylvania Railroad stopping at New Brunswick. We have let a contract for a five ship hangar costing approximately $20,000. We will erect radio masts. We are now installing boundary lights every 100 ft. In the center of the field, marking the landing the will be a depressed mushroom red light On a 90 ft. tower will be one 500,000,000 candle power electric are beacon, casting a beam for 150 mi. and revolving three times a minute around the horizon. On the ground, for floodlighting, will be another 500,000,000 candle power beacon Buildings, radio masts, wind cones, etc. will all be flood lighted

"Bellefonte, Pa., 220 mi. from New York, will be made a main field and similarly lighted. Between Hadley Field and

Courtesy *New York World*

A speedy correspondent

Bellefonte, and Bellefonte and Cleveland we will lay out twenty-two emergency fields For obvious reasons the location of these has not been determined We have three or four equally good routes to choose from. At each of these fields there will be one 5,000,000 candle power electric revolving beacon and one of similar power for ground lighting. These 5,000,000 candlepower beacons have a visibility up to 40 mi. Only from three or four of the fields will timber have to be removed. At Snowshoe, Woodward Pass and on another peak—the three highest points in the Alleghenies—the Pennsylvania forest service has watch towers. The Post Office Department is requesting permission to install beacons at each place.

World's Longest Lighted Airway

"When we started our transcontinental service July 1, our night flying division extended only 885 mi. from Chicago to Cheyenne As winter approaches, we have extended our lights eastward 340 mi. to Cleveland, making both Cleveland and Bryan, Ohio, main fields, and lighting eleven emergency fields. These lights, of course, can also be used for the New York-Chicago night service. We have extended westward 240 mi to Rock Springs, Wyo., making both Rock Springs and Rawlins main fields and lighting eleven emergency fields. As our transcontinental schedule calls for arrival at New York at 5:05 p. m and at San Francisco at 5:00 p m. illumination on both Atlantic and Pacific coasts is necessary. I have already arranged for the New York end, as indicated. Today I received a radiogram from W. E LaFollette, Superintendent of our Western Division, stating that he had leased a 75 acre night terminal at Concord, Calif., 25 mi. east of San Francisco Our present field at San Francisco, of course, will be retained, but Concord, lying east of the Contra Costa hills is free from fog, and also is within quick reach by motor and electric car from the San Francisco ferries and from Sacramento As further insurance we have negotiated for emergency fields at Point Richmond and Redwood City. These with the San Francisco terminal, will also be illuminated

"At the fifteen main fields we have 94 planes. Five of these are based at New York, two at Bellefonte, seven at Cleveland one at Bryan, and four at Chicago With the establishment of night flying between New York and Chicago the number of planes between these points will be increased from 19 to 38 The pilots now on the transcontinental service, and who are being trained to take over the announced night service are J. D. Hill, E. Hamilton Lee, C Eugene Johnson and Wesley L. Smith, flying out of New York, Paul Collins, C H. Ames and E. F Ward, flying east from Cleveland, Warren I Williams, Art Smith, George Myers and Shirley Short flying west from Cleveland.

"The planes for the New York-Chicago overnight service will for the present be DeHevilands of the standard Air Mail type. In day flights these ships can carry 500 lb. of mail each. Night flying equipment weighing 225 lb. will be added. Each plane is to carry wing tip landing lights of 25,000 beam candle power, running lights, red and green on the wing tips, white in the tail Underneath the pilot, pointing downward, are two parachute flares These, on being released by trigger, automatically open and ignite They are rated at 500,000 candle power and will burn 3 min. At 1,000 ft. one of these flares will illuminate from 40 to 50 acres Night pilots, of course, will each be equipped with the standard Air Mail seat pack parachute."

Detroit Will Have Two Modern Airports

City Authorizes Municipal Airport—Ford Airport Opened

On Monday, Nov 12, The Common Council of Detroit approved every detail of a recommendation made by the Aviation Committee of the Board of Commerce, and ordered the Corporation Counsel to condemn land for a Detroit airport

The airport recommended by the Board, and approved by the Council, is ideal Located on the banks of the Detroit River, just east of the Edison plant, within 15 min. of the downtown district, the airport is available for both land and seaplanes Detroit is now on the air map and the Common Council has taken a wise step which will go far toward interesting the aircraft industry of America in Detroit.

In commenting on the action of the Council *The Detroit Times* said:

"Within a month condemnation proceedings will be started and the city will acquire 165 acres on the riverfront east of the Detroit Terminal Railroad for use as a landing field for airplanes.

"By 1926 Detroit will be on the world's air map

"The Board of Commerce, through a committee of live business men and experts, is to a large degree responsible for bringing this matter to a successful termination

"Detroit should be the hub of the world's airplane industry, just as it is the automobile center of the world today The two branches of manufacturing are so closely allied that failure to do everything possible to bring aircraft production to Detroit would be criminal negligence.

An view of Ford Airport, situated within 25 mm. of Detroit's post office which is already open to air traffic

"Securing an adequate plane field is an important step in the right direction, and the Council is to be congratulated on its decision."

An Ideally Situated Airport

"The Common Council has acted wisely in taking the first steps toward securing an aviation field for Detroit within reasonable distance of the center of the city. The site chosen seems almost ideal. It is much nearer the heart of Detroit than is the case with landing fields in most large cities. Those of London, at South Croydon and at Hendon, are nearly an hour's journey by motor from the business district. The famous airdrome at Le Bourget is a considerable distance from Paris. Detroit will soon be spread far beyond the new aviation field site. Eventually it is possible, a roadway along the river bank leading to the Memorial Hall at the foot of Woodward Avenue will permit a still greater speed in going from the landing place to the business center. Thus the site ties in very neatly with the city plan.

"Detroit is not acting a bit too soon in moving to acquire this field. When it is improved we will have one more argument for linking this city with the air mail routes both the transcontinental now in use and the north-south line which is sure to come in the near future, and which should have Detroit as one of its termini.

Commendable Foresight Shown

"Possession of a landing field is likely to have great weight with Post Office Department and with Congress.

"There is an additional reason for the quick completion of plans outlined for the aviation field. No one knows how soon commercial aviation is going to burst into bloom but most experts are agreed that the moment is coming and that the development of commercial use of the air will proceed with a rush. The cities that are ready for it will profit by the first great movement, which is often decisive. There are men here who are ready to do their utmost to make Detroit the airplane center of the country as it is the automobile center.

"The Common Council has done well to show foresight in this matter and to act with decision on a scheme which has the sanction of such eminent brains as those behind the movement."

Co-incident with the action of the Detroit Common Council in providing a municipal airport comes the announcement that the new landing field at Dearborn, Mich., will be known in the future as the "Ford Airport." This field is located a quarter of a mile south of Michigan Ave., on the east side of Dearborn. The northern boundary is Oakwood Boulevard, which like Michigan Ave. runs directly to Detroit, and is only a 25 min. drive to the Post Office.

Ford Airport Increased in Size

Since the first brief announcement of this project made several months ago, the field has been increased in size so as to take care of the largest types of ships, and work on the field has been rushed in order to make it ready for use this fall.

The field is the donation of Henry and Edsel Ford, made in the interests of commercial aviation, "there being no intention on the part of the Ford Motor Company to go into the airplane business, other than to watch its development," as outlined in a statement issued by Edsel Ford. Although it is not meant to take the place of Detroit's municipal field, all civilian as well as Army, Navy, and Air Mail pilots will be welcome, and it will no doubt be the terminal of air line companies now being formed which will operate between Detroit and other large centers.

Gasoline and oil will be available for visiting pilots, and before long a small stock of spare parts for the more popular makes of civilian planes will be carried. The same rules for visiting pilots which were recently put into effect by the Army Air Service will be adopted, thus permitting pilots to land on the field and stay for a period of 24 hr., but no passenger-carrying flights or exhibition flying of any kind will be allowed without special permission.

Details of the field show that nothing has been left undone to make it one of the leading airports of the country. On a tract of land comprising 260 acres there have been laid out, in the direction of the prevailing winds, two 300 ft. wide runways, one 3700 ft., and the other 3400 ft. long. These runways are entirely free from obstacles, and all interfering high tension wires have been placed under ground. The ground in front of the hangar and extending into the field for a distance of 100 ft. was elevated 16 in. to the grade of the floor of the hangars, and filled with Tarvia covered cinders to provide a space dry at all seasons over which ships can be rolled by hand. More than 20 mi. of draining tile was laid, for quick drainage in wet weather, in order that the field might be suitable for year-around operation, this emptying into two 8 in. mains.

Aircraft Factory on Field

Facing the field is a building now occupied by the Stout Metal Airplane Co., and large enough to permit the building of a plane a week, of ships the size of the Stout Air Pullman, production of these planes having already started.

In this factory will also be fabricated parts for the metal-clad airship now under construction by the Aircraft Development Corp., also of Detroit, to the designs of Ralph Upson, the well known airship engineer. Both companies are engaged in the manufacture of aircraft for commercial purposes, and on the directorates of these two companies will be found the names of Detroit's most prominent men.

On the east side of the field runs a branch track of the Michigan Central Railroad, Connecting Dearborn with Delray. These tracks, while not being used at the present time, could not be removed or disconnected. With the consent of the railroad company, however, they were dropped 4 ft. and placed 6 in. below the grade of the runway. This operation eliminated the necessity of moving 50,000 cu. yd. of earth.

In the center of the field, the name "Ford" appears in letters 200 ft. high, made of white crushed stone. This is visible from an altitude of 10,000 ft., so that visiting pilots flying to Detroit will be able to spot the field from a considerable distance. Later on, when conditions warrant, provision will be made to illuminate the field for night flying in a manner similar to the lighting system now employed by the Air Mail.

Astronomical Methods in Aerial Navigation

N.A.C.A. Report No. 198

This report by K. Hilding Beij was prepared by the Aeronautic Instruments Section of the Bureau of Standards, at the request of the National Advisory Committee for Aeronautics. A part of the material was made available by the courtesy of the War Department, from the results of investigations carried out at the Bureau of Standards for the Army Air Service.

The astronomical method of determining position is universally used in marine navigation and may also be of service in aerial navigation. The practical application of the method, however, must be modified and adapted to conform to the requirements of aviation. Much of this work of adaptation has already been accomplished, but, being scattered through various technical journals in a number of languages, is not readily available. This report is for the purpose of collecting under one cover such previous work as appears to be of value to the aerial navigator, comparing instruments and methods, indicating the best practice, and suggesting future developments.

The various methods of determining position and their application and value are outlined, and a brief resume of the theory of the astronomical method is given. Observation instruments are described in detail. A complete discussion of the reduction of observations follows, including a rapid method of finding position from the altitudes of two stars. Maps and map cases are briefly considered. A bibliography of the subject is appended.

Report No. 198 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

N. Y. World Probes Government Air Situation

The New York World recently made an investigation of the governmental aircraft situation in Washington and its effect on America's standing as an air power. Peter Vischer, who was in charge of this investigation, was formerly a member of the editorial staff of AVIATION. *Limitation of space makes it impossible to reprint this series of articles in large type, but as it is probably the clearest and most unbiased presentation of governmental aircraft activities that has as yet been written, it is reprinted below in smaller type and in full, so that it may be studied with all the care the subject warrants. We urge that this series be read in its entirety, for it will give readers of* AVIATION *a comprehensive picture of the costs, operation and hopes of the governmental air services.*—AVIATION.

What is the United States doing for aviation? The World has just completed an exhaustive inquiry into the situation, gathering the data from the War, Navy and Post Office Departments and presenting [illegible] for the first time, even to these officials, a complete statement of just what has happened and what ought to happen if American [illegible] be regained and maintained. The details of the [illegible] will be [illegible] in a series of articles, of which the following is [illegible]

By Peter Vischer

I

America is the cradle of aviation. And as it is probably natural that Americans have come to take it for granted that this Nation [illegible] the world in aeronautics. Recurrent courageous and spectacular [illegible] on the part of American fliers, than whom there are none dar[illegible] [illegible]

But the facts are unhappily not so. The United States does not lead the world in air defense. It leads the world in records, but [illegible] defeat an enemy air fleet with records any more than you can [illegible] back from [illegible] shores. And quite aside from where other nations stand, this Nation is far from where it ought to be.

That has come about as the result of a curious mixture of [illegible] authority [illegible] false economy where it does the most damage, [illegible] where it does little good, petty jealousies mountain high, duplication [illegible] as what to [illegible] of policy.

Inquiry Was Thorough

This statement is made only after a thorough investigation of the aeronautical situation for The World. Responsible officials in Washington, beginning with the President, all deeply interested in aviation—[illegible] impartially and some for their own reasons—were approached [illegible] the question was discussed frankly and at length.

The opinions expressed were carefully weighed and balanced. A number of facts were found to stand out indubitably. Others were found susceptible of controversial interpretation.

First and foremost: the United States is spending annually for aviation—millions more than for the Department of State or Commerce combined—and has very little to show for it in air [illegible] the development and construction of aircraft is, of course, [illegible] aviation. We maintain air services in order to get airplanes [illegible]

Fewer Planes Yearly

During the last five years we have spent more than $350,000,000 on aviation yet our aircraft strength (serviceable planes on hand and on order) consists of 1,618 airplanes, all but a fistful of them obsolete or obsolescent.

Every year, instead of having more planes we have fewer. We are spending huge sums for plans and establishments but not for planes. In other words, we have stables, and those none too good, and only a few colts and some broken-down nags to put in them. Paper airplanes can't fly.

What has brought this condition about?

A search for the cause leads through a maze of Government offices and bureaus, a dense forest of figures and a cross-fire of conflicting opinions, bitter and seemingly irreconcilable. Therein is at once found one cause of the trouble. Our aeronautical activities are divided among twenty-one bureaus. There is no responsible head. There is little cooperation, much competition and jealousy and some overlapping.

There is no policy. There is no one in either house of Congress who is an authority on aeronautics. No committee has aviation matters in charge, unless it be a committee gathered now and again to sniff for scandal and trouble, a detriment to aviation rather than a help, in that it accomplishes little further than to undermine public confidence in flying.

No Commercial Aviation

It must be understood that virtually all American aviation depends upon the Government. We have an aeronautical industry, yes. We have a number of designers and engineers, builders, pilots and others engaged in private aeronautical enterprises. But they all have to look to the Government, to the Army and the Navy and to a much lesser degree to the Post Office Department. By themselves they are helpless or nearly so.

Our commercial aviation at the present time is virtually negligible, although there are promising developments among a group of non-Government manufacturers in the Middle West. There are a few commercial lines operating spasmodically rather than on regular schedules. There are quite a few gypsy fliers. There are a few projects in which aircraft are used such as forest patrols and cotton spraying and bootlegging.

But by and large, there is no commercial aviation to speak of in this country. We have nothing comparable with the London-to-Paris or the Brussels-to-Berlin line, or the several similar transportation enterprises in Europe, partially due to the fact that they are run mainly to earn the subsidies put up for their operation rather than the fares paid by the American tourists who form the bulk of their passengers.

Not Enough for Defense

Our three important aviation projects are those of the Army Air Service, the Navy Bureau of Aeronautics and the Air Mail of the Post Office Department. Our Government makes other aeronautical efforts, but they are relatively unimportant.

Our concern then is with airplanes for the national defense. We haven't enough. Those we have aren't much good. Most of them are out-of-date leftover wartime stock. This condition cannot be remedied before 19[illegible] at the earliest, and not then unless some definite policy is adopted now.

There probably never has been a finer time for definite action than the present, because public interest is aroused in aviation now as it has never before been in this country, not even during the stirring days of the war.

The President says he is personally interested. Army Generals and Navy Admirals are engaging in heated controversies. The Director of the Budget is holding hearings and seems to be inclined to grant greater appropriations for aeronautics even if the general Army and Navy budgets are reduced. A committee is busy on one of Congress' periodical investigations. Congress in session to hear long discussions on all phases of aeronautics from appropriations to the airplane vs. battleship controversy and the oft reiterated demand for a separate Air Service.

It is the time for an understanding of our aviation problem and then action, definite and unselfish.

The nation must, for its own protection and defense if not just in plain common sense, decide upon some fair policy as regards aviation.

As things stand at present, there is just a muddle. In the meantime we are slipping back, or at any rate standing still while other nations go by.

And our fliers are risking their lives in inadequate equipment.

II

While the United States goes at its aviation like a ship without a rudder (and fliers know what that means: a crash), England, France, Italy, Japan and Russia are making rapid progress in building up their defenses.

The United States had a head start on these nations, for Americans were the first to fly. Indeed, in spectacular and daring feats Americans still lead. Americans hold most of the world's aviation records. Americans are temperamentally great fliers (so are Canadians and Australians) and there is no record that an American cannot go after and get.

We Lack a Policy

That holds for individuals. As a Nation we lag. We have little or nothing with which to back up our records. We don't know what we want in aviation and naturally we cannot get it. Other powers have definite aviation policies. They are developing their air forces along progressive lines. We are developing our aviation from moment to moment. And every year we have fewer and fewer planes.

With the sums of money we have expended for aviation during the past five years—a sum in excess of $350,000,000—we might have built the finest air fleet in the world. Three things make great air forces: aircraft, personnel and an industry. We might have had all three.

France's Fleet Largest

Here is what other nations are doing:

FRANCE—The greatest air fleet in the world, in point of numbers, belongs to France. The French have approximately 1,200 planes, most of them fast single-seater fighters known as Nieuport 29's. Every year the French build 200 to 300 planes for replacements. Their fleet is kept up to the minute. Since the war France has spent 4,800,000,000 francs on military aviation. The budget this year ran 80,000,000 francs. The French have a definite air program.

600 in Britain's Air Fleet

GREAT BRITAIN—The British Air Force, which has charge of all aviation in Britain, has about 600 planes. It has fifty squadrons with twelve planes per squadron, all of them kept up to 100 per cent war strength even in peace. They are distributed as follows: India, six; Mesopotamia, eight; Egypt and Aden, three and one-third; Palestine and Transjordania, one and one-third; allocated to the navy, ten; allocated to the army, four and one-third; others, sixteen. British expenditures ("effective services" only) exclusive of money spent in India: 1924, £10,257,400; 1923, £18,472,000; 1922, £14,473,704; 1921, £16,318,883; 1920, £23,818,864.

The British have this carefully planned policy. They maintain only a relatively small air fleet, as compared with France, but build up with meticulous care their administrative and ground organizations so that in case of emergency they could quickly expand to wartime strength.

ITALY—When Mussolini came into power he took immediate steps to build up Italy's air power. He formed a single air force and appointed himself its High Commissioner. In two years he made enormous changes. His first air budget was for 136,000,000 lire and this year's was increased to around 384,000,000 lire. Much work is being done in observation and radio communications. A total of 140 test raids have been carried out under Mussolini, all over distances of 200 mi., twelve of them across the Alps and over thick fog banks. He has 666 planes, most of them quite modern and serviceable. He is training 500 pilots a year. Much development work is being done.

Japan Unusually Busy

JAPAN—Japan is taking an unprecedented interest in aviation. The Japanese air fleet is being greatly increased, so much so that figures of the increase are being carefully guarded. It is known, however, that models of nearly every successful European plane have been taken to Japan for reproduction. For instance, two Rohrbach Ro II twin-engined flying boats with Rolls-Royce Eagle engines, two of the newest Dorniers, patents of Nieuport twenty-one and twenty-nine fighters, which form the mainstay of the French war forces, Farman bombers with Salmson engines. Pilots are being trained in Europe and Japanese schools are being conducted with French and British instructors.

Japanese plants are understood to be busily at work and under such severe supervision that one plant does not know what the other is making. The exact number of planes Japan has is not known, although it is admitted that the Japanese are to have an unusual interest in machines capable of carrying heavy weights for long distances.

For 1924 the Japanese estimated an expenditure of 1,997,741 yen for the army 1,082,556 yen for the navy, and an additional 102,000 yen for aircraft carriers.

RUSSIA—Just what Russia is doing is not generally known. Russia has, however imported several of the fastest French machines. And this is significant, if the report made last January from Stockholm is accurate Fokker of Holland has received an order from Russia for 1,500 planes equipped with Napier-Lion engines of 450 hp.

Expenditures by U S

What has the United States done to keep up with these other powers? The following sums have been spent for aviation "N.A.C.A." standing for National Advisory Committee for Aeronautics

1920	
Army	$35,787,838.02
Navy	22,834,000.00
Post Office Department	850,480.85
N.A.C.A.	175,000.00
	$60,296,765.57
1921	
Army	$44,311,830.46
Navy	37,488,500.00
Post Office	1,349,448.21
N.A.C.A.	200,000.00
	$83,348,776.07
1922	
Army	$30,140,980.17
Navy	65,230,583.01
Post Office	1,284,344.85
N.A.C.A.	200,000.00
	$96,855,881.03
1923	
Army	$22,857,828.37
Navy	34,758,807.01
Post Office	1,918,719.50
N.A.C.A.	310,000.00
	$58,848,155.88
1924	
Army	$22,687,482.08
Navy	31,168,448.64
Post Office	1,800,000.00
N.A.C.A.	270,000.00
	$56,055,031.72

The total makes $345,704,523.47

The Army figures are as given by the office of the Secretary of War. The Navy figures are as given by Admiral William A. Moffett head of the Bureau of Aeronautics or estimated from official records.

The figures are not exact to pennies, and if all costs were included—such as the maintenance of aircraft carriers for the Navy and minor aeronautical activities such as forest patrols—would run well above $350,000,000 probably so far above that the total war cost estimated at $425,000,000 would be eclipsed.

Full Fund Not Used

If this money had been used expeditiously the United States would now have a considerable air fleet. But it wasn't used to its full power, first because muddy bookkeeping in the Army made that impossible, and second because the heads of both the Army Air Service and the Navy Bureau of Aeronautics were not satisfied they could buy planes that would not be obsolescent almost before the money was spent.

In 1920 for instance the books of the Air Service showed an unobligated balance of $112,384.25. But Treasury records showed that actually $765,425.31 was paid into the surplus fund of the Treasury because it had not been used. In 1921 Air Service records showed an unobligated balance of $368,923.52 but Treasury records showed that $2,022,142.95 went into the surplus fund. Of this total $1,080,081.52 was somehow lost track of by the Air Service because of faulty checking this sum was completely lost for use.

In 1922 Air Service records showed an unobligated balance of $2,[illegible] But what the Air Service actually failed to use was $2,459,265.77. Some of this was due to faulty checking and some was not. Of the total $808,000 was ordered saved by the Secretary of War. An additional $1,000,000 was deliberately held out by Major Gen. Mason M. Patrick then just made head of the Army Air Service because he feared that if the money were spent it would be wasted. That $1,000,000 he succeeded in having reappropriated for this year so that actually $1,4[illegible]8,265.77 went into the Treasury surplus fund unused.

Navy Close to Margin

It must be said to General Patrick's credit that he promptly caused a new system of checking to be installed, so that now very little of the money available for air service purposes is left unused. The unobligated balance for 1923 is only $1,890.21 which is about as close as one can get. The unobligated balance for 1924 was a few weeks ago only $12,189.14 very close figuring.

The Navy did not lose any of its funds in this way. Nothing was carried to the surplus fund from either 1921 or 1920. In 1916 the Navy had a surplus of $20,809,917.61 but this was never turned over to the surplus fund the Navy succeeded in turning that huge sum over to its own Naval Supply Account Fund. For the past two years the Navy claims to have been running very close to the margin, which is as it should be.

Now, why aren't there more aircraft? There seems to have been sufficient money to do business enough even to let some millions slide back into the Treasury's surplus fund.

During the fiscal years 1920 to 1924 this sum was spent by the Army for new aircraft and new engines

1920	$4,765,847.66
1921	6,758,288.81
1922	2,503,277.08
1923	1,258,395.77
1924	1,085,236.03
Total	$16,382,122.82

If one wants to be exceedingly generous and include with new aircraft and new engines also remodeled aircraft and engines spare parts and accessories airships balloons etc the total reaches $28,808,309.21. Including all these items is really exceeding generosity when one is looking for what was actually spent on aircraft, looking for the reason why we haven't more and better airplanes today.

Now, during that same period, the following sums were spent on experimentation and research, mostly if not all at McCook Field, Dayton, Ohio

1920	$4,544,185.90
1921	5,985,002.99
1922	4,192,262.75
1923	6,161,760.07
1924	2,927,160.72
Total	$20,810,873.07

The rest of the money spent by the Army during those years went for pay of officers men and civilian personnel, construction, improvement and maintenance of flying fields, which are temporary at best, with the exception of Langley Field and the naval aircraft factory, supplies etc.

The situation in the Navy is not analogous, although great sums were spent in the Navy too for experimentation rather than for aircraft. Navy figures for all years are not available, but these estimates for 1925 are illuminating

For maintenance, repair and operation of aircraft factory stations testing laboratories etc	$6,716,888
For continuing experiments and developing work on aircraft	1,578,324
For new construction and procurement of aircraft equipment	5,364,828

All these figures show the high esteem in which experimental work is held even at the cost of new construction when General Patrick has time after time called public attention to the fact that his air service is badly in need of planes. His report for 1924, which has never been published says

"The critical condition with regards to flying equipment has been brought to the attention of the War Department time and time again during the past few years . . . . The condition is acute now and will become aggravated during 1925 and 1926."

Committee to Get Facts

General Patrick wants a definite aviation policy which will allow him $10,000,000 a year for the next five years for the purchase of new aircraft. He would spend 40 per cent of it for pursuit planes 20 per cent for observation 20 per cent for bombardment and 10 per cent for attack. That he does not intend to build these at the expense of experimentation and research is evidenced by the fact that he would spend $4,000,000 on a new McCook Field at Dayton during the next three years.

All these figures and more unavailable to outsiders, will probably be brought forth at the hearings of the Select Committee of Inquiry into Operations of the United States Air Services which expects to hear about 150 witnesses—some time after election.

This committee consists of Florian Lampert (R. Wis.) Chairman Albert H. Vestal (R. Ind.) Randolph Perkins (R. N. J.) Charles L. Faust (R. Mo.) Frank R. Reid (R. Ill.), Clarence F. Lea (D., Calif.) Anning S. Prall (D. N. Y.) Patrick B. O'Sullivan (D. Conn.), and William N. Rogers (D. N. H.) J. Frederick Richardson Jr chief consulting investigator Alexander M. Fisher investigator and statistician, and C. Frank Creighton auditor and clerk.

III

Colossal sums of money have been spent by the United States Government for aviation during the past five years. Since 1920 this Nation has spent more than $350,000,000 for aviation—a figure comparable to the stupendous and once considered scandalous cost of aviation during the war.

The cost of war aviation is now rated at approximately $425,000,000. Of this sum $382,13[illegible],113.50 was expended by the Army according to the Army's own figures. The actual cost of naval aviation has never been made public but it undoubtedly makes up the difference.

If all aviation costs during the past five years were reckoned including expenditures left over from the war, they might easily reach the $425,000,000 aviation cost during the war.

What has the Government to show for this? It has an Army Air Service a Navy Bureau of Aeronautics and a Post Office Department Air Mail—plus so large a group of minor aeronautical efforts that the total runs into twenty-one bureaus. Of these only the Air Mail can be rated a real success. The Air Mail knows what it is after, tends to business and gets excellent results.

Army Service Has No Goal—Floundering Without Head

The Army Air Service and the Navy Bureau of Aeronautics (the latter in lesser to a lesser degree) are floundering along doing the best they can on a sort of hand-to-mouth existence. They have only a vague idea of what they're supposed to do or how they're going to do it.

The reason for it is that this Nation has no such thing as an aviation policy. There is no one responsible for aviation. There is only a muddle. And as a result, there is very little to show for the huge expenditures taxpayers have been forced to make. Neither the Army nor the Navy has anything like the aircraft each ought to have.

There is a possibility that this condition may be remedied in the near future. Public interest has been aroused in aeronautics as the result of recent exploits of American pilots. Our planes have flown 264 mi./hr. stayed in the air thirty hours, climbed 10,000 ft. in ten minutes, carried 4,000 lb. bombs, reached an altitude of 35,000 ft., crossed the Atlantic, made a non-stop flight of 2,700 mi. crossed the continent from daylight to dusk sunk battleships seventy miles at sea flown around the world.

Hearings are now being held in Washington by the General Board of the Navy to discuss the relative merits of battleships and airplanes. they focus attention on aeronautics. Hearings are being held by the Director of the Budget to determine if the air services deserve the increased appropriations they are demanding.

Hearings are soon to be held by the Select Committee of Inquiry of the House into Operations of the U. S. Air Services and these are expected to develop into an exhaustive study of the entire aeronautical situation.

Coolidge is Aroused

Furthermore the President is taking a personal interest. When he recalled Secretary of the Navy Wilbur from the Pacific Coast he said it was to discuss a phase of aeronautical development. He was personally represented at the recent International air races at Dayton, Ohio, by Brig. Gen. William Mitchell Assistant Chief of the Army Air Service, though Maj. Gen. Mason M. Patrick, then Acting Secretary of War Dwight Davis and other high Government officials were on the ground.

The public interested in aviation looks to Mr. Coolidge for some sort of action for he is the first Chief Executive who has shown any interest in aeronautical problems.

It is generally understood that while Mr. Coolidge is thoroughly for peace he firmly believes that this Nation must insure its national defense and must look to that defense in the air as well as on land and at sea.

It is said by persons close to the President that he deliberately precipitated the battleship-airplane controversy, because he believed its conclusions

are pressing. He is said to feel that the General Board would give careful consideration to this important question and would reach exceedingly valuable conclusions.

President Seeks Opinion

What will be particularly interesting to those who have followed progress in aeronautics will be that those close to the President say he does not intend to confine his attention to the advice of old-school Generals and Admirals though naturally he said he intended to give their opinions the weight he considered they deserved. He is expected as well to seek advice and counsel from whatever source is open to him.

Furthermore another effort will be made to bring about a separate air service. General Mitchell who is the great crusader for this said that he expected a bill similar to the Curry bill, which died in committee, would be introduced soon after Congress reconvened. This provided for a separate air service under a Secretary of Aeronautics. And General Mitchell frankly predicted that the bill would be through by Christmas.

A close study of the situation in Washington would lead one to believe that General Mitchell is optimistic. In the first place any bill for a separate air service would certainly find itself the center of a terrific fight in Congress and out. Generals and Admirals would be hot against it. The whole Navy would fight it. Some of General Mitchell's own associates would oppose it.

Then would come a great controversy as to whether any separate air defense unit should be an Air Service or an Air Force. A very careful distinction is made here. The Air Service proponents, like General Mitchell would take all aeronautical activities under their wing, lending out aircraft assistance whenever needed. The Air Force advocates say that the Army and Navy need planes as means of transportation and for observation and they ought to be permitted to keep aircraft for those purposes. All that ought to be put into a new organization, they say, ought to be the Air Force the air fighters.

Central Head Sought

Furthermore it was made evident at the White House that "the tendency today is toward centralization rather than decentralization." It was pointed out that rather than create a new department some people want to combine the Army and Navy under a single head a Secretary for the Defense. Which means that General Mitchell's plan is a possibility, but hardly a probability. There will be a long fight before the Army and the Navy . . . under one head with aviation beside them and on a parity with them.

Some day in all probability there will be a separate Air Service or Air Force whatever it may be called. Great Britain's success with an Air Force after many trying experiences seems to indicate that. But the day still seems a distance off.

But, before the United States institutes a separate Air Department much can be done to make the Army and the Navy more efficient as regards aviation.

The provinces of the two services could be clearly defined. The cooperation now existing could be greatly extended. Overlapping and duplication could be wiped out. Jealousies might be eliminated although where competition exists there probably must be some jealousy. Most important of all some of the huge overhead necessary now might be cut down to make more money available for aircraft.

P O Service Income

Planes and more planes should be kept ever in mind for you can't fly buildings and factories not even executive offices.

Little need be said about the Post Office Department. Since 1918 about $8,500,000 has been expended on the air mail with an inventory of $1,500,000 showing today. In the fiscal year 1924 $1,500,000 was appropriated. For 1925 the total in order to permit experimentation has been raised to $2,750,000. An annual income of $700,000 has been built up.

The Post Office has seventy-five planes all De Havillands, obtained from the Army for nothing and rebuilt at a cost of $2,000 each. They fly regularly and on schedule every day. Last year they flew 1,630,000 mi. with a record of 97.83 which means that out of every hundred flights ninety-seven were finished on time. They are on the job every day and every night.

The Air Mail Service is the only real commercial aviation effort in the United States. Credit for its success belongs to Paul Henderson Second Assistant Postmaster General and to Carl F. Egge General Superintendent of the Air Mail Service gentlemen often referred to as "hard-boiled and efficient as hell."

(To be continued)

England to Build Steel Airship

Our readers will remember that the construction of two rigid airships of 5,000,000 cu. ft. capacity was recently authorized by the British government for an imperial air route from England to Egypt, India and Australia. Details of one of these ships, which has been contracted for by the Airship Guarantee Co., of which Commander Burney is the moving spirit, were given in our last issue.

Regarding the second ship, which will be built in the airship works at Cardington, formerly belonging to Short Brothers and now under the supervision of the Royal Air Force the following information was made public by Sir Samuel Hoare, the new British air minister. In the first place, the framework of the ship will be of stainless steel, as against duralumin used in the Burney airship as well as in all other rigids so far.

The total lift is to be 155 tons as against the figure of 152 tons for the other vessel, and a disposable load of 75 tons, and 20 tons should be available for passengers and goods on the trip of 2,500 mi. to Egypt.

The approximate over-all length is 720 ft. as compared with 695 ft. for the Airship Guarantee Company's vessel, and the maximum diameter 130 ft., two feet less. The maximum height is to be 140 ft. Crude oil will be burned in seven engines of 600 hp. each, instead of gasoline.

A maximum speed of 50 mi./hr. is estimated and 100 passengers will have their accommodations spread over two decks.

While the make of the engines to be used is not given, it is worth noting that the Beardmore firm of Glasgow, Scotland, has for some time been conducting experiments with a heavy oil engine for aircraft use. In a lecture held before the Royal Aeronautical Society, A. E. Chorlton stated that this company had recently produced six and eight cylinder engines of the vertical type, with 6 9/16 in. bore and 12 in. stroke. The normal speed is 1200 r.p.m., at which the six cylinder unit develops 800 hp. and the eight cylinder unit 1050 hp. The weight of the two engines is 1825 and 2350 lb. respectively, or approximately 2¼ lb./hp. An engine of the same type, but fitted with cylinders of smaller bore and with a fuel injection pump, had been made to run on crude oil, but it gave less power than the gasoline engine.

The Winslow Bill

Congressman Winslow has written to AVIATION a letter commenting on the editorial in which it was suggested that the supervision of national aviation be put under the Air Mail instead of the Department of Commerce. He writes:

"I have read the editorial carefully and I write to you that I appreciate your point of view and expression thereof.

"The whole subject of aviation and legislation looking thereto is very complicated. It has at times seemed to me to be the most hopeless task with which I have been confronted in my Congressional Committee work. You understand all this. There are a lot of considerations which must be borne in mind in framing such an initial bill as the one which is known as the Winslow Bill. I don't assume for a moment that the first attempt at legislation will be either sufficiently comprehensive or even accurate in respect of conclusions reached. We are trying to do our best, but every few moments somebody else bobs up with some idea of more or less merit which is calculated none the less to disturb the conclusions reached up to the minute.

"I think there would be some federal department objection to the suggestion you have made, and quite likely some others. The best I can do is to hope that you have struck the right conclusions in respect of the point which you have raised. If we have a hearing on the bill as the sub-committee may report it back to the full committee I hope that you or somebody honestly interested in the subject will appear and present your arguments. We shall need every friendly suggestion which can be offered. At all events your editorial will likely stir up discussion and that is always desirable if well-intended and hearty."

Italian Glider Meet

An international meet was held recently at Asiago, Italy, under the auspices of the Italian National Air League, for the purpose of developing the construction and operation of motorless planes. A number of well known German glider pilots participated in the meet, and it was they who made by far the best performances, showing that the Italians are still very much backward in gliding activities.

The most remarkable performance was a 12½ mi. gliding flight made by the German pilot Martens on a Konsul glider. The value of this performance lies not so much in the distance covered—for the starting point was 4600 ft. above the level of the landing place—as in the fact that this flight was made in a wind of only 5 ft./sec. which practically precluded the use of ascending air currents. Martens stated that while he encountered a few feeble upwinds there also were downward currents, which makes his performance all the more remarkable. He added that had he had a wind of 15 ft./sec. he probably could have covered twice the distance, for in that case he could have utilized the ascending currents impinging against the mountain sides. Martens' flight lasted 19 min.

The Italian gliders entered in this meet only made brief flights, none of which exceeded one minute in duration.

Photographic Measurements in Aerodynamics

By ING. R KATZMAYR

Translated from the German by O C Koppen

In the combination of the two sciences of photography and aerodynamics, it is the writer's opinion that the greatest advance has occurred in the science of aerial photography, especially in the sphere of aerial surveying Aerial photography is one of the few sciences which advanced with rapid strides to a high degree of perfection during the war and is capable of being used in time of peace. However, this article will not deal with aerial surveying, but with a little known but important use of photography.

Every photograph represents a projection of the photographed object on the photographic plate, and each point

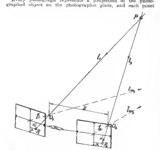


Fig 1 Diagrammatic sketch showing principles of photographic camera

on the image corresponds to a point on the object. The optical center of the object is the center of projection If we observe the left hand half of Fig 1, it is easily seen that with the aid of the coordinates x_1 and y_1 of the point p_1 on the plate relative to the projection of the focal point o_1 of the lens, or the focal length, and the distance f_1 of the lens from the plate, we can construct the light ray l_1 It is also seen that the position of a point P is not fixed when it is known that it lies somewhere on the light ray l_1 A second image must be obtained by moving the camera to a point o_2 With the aid of the coordinates x_2, y_2 and f_2 the ray l_2 can be constructed The intersection of the rays l_1 and l_2 gives the exact location of point P, and if in addition the distance D between o_1 and o_2 and the angle ω are known both plates can be located This illustration shows that the plates are exactly vertical and that the optical axes lh_1 and lh_2 are perpendicular to the plane of the plates and lie in the same horizontal plane. This simplification is the result of the easy conditions of the illustration; now remains the problem of locating the point P when the two photographs do not exactly match

In this case three or more photos of the point P are taken and these may serve as an indication of the precision of measurement, for all of the construction rays l_1, l_2, l_3 should intersect at the point P Although a true image of the point should be obtained on all of the plates, in practice it is not always easy to fulfill this condition In the following description of special cases the object is to ascertain the most convenient identification points. The accuracy of the result is dependent upon the length D, since for large values of D the light rays are at a large angle to each other and the intersections can therefore be located with precision

A special case of such work is called "stereo-photography" In this case the optical axes of the several cameras are exactly parallel For small distances of the point P of the object a separation D of only 70 mm is required and both cameras are joined in a single stereocamera

The stereophoto can be accurately measured in a special machine called the "stereokomperator," the location of the identification points is also simplified by the perspective effect. The greatest accuracy that can be expected is to locate a point within 0.5 m at a distance of 2000 m if a focal length of 200 mm. is used and the distance D = 500 m.

Determining a Propeller Profile

An example of the use of photographic measurement is given in the determination of the profile form of a propeller The cross section of the propeller blade not only varies in thickness from hub to tip for structural reasons, but also changes in section to give the best profile form It is important that the profile form and position in relation to the plane of rotation of the propeller should be in accordance with the designs. Direct measurement of the finished propeller is inaccurate, and the highly polished surfaces and edges of the blades are liable to be marred during the process. The photographic method has neither of these drawbacks. It consists of shining a plane of light (Fig 2) through a narrow slit by means of an electric light upon the upper surface of the blade to be checked up The line which appears on the surface of the blade is one half of the required profile provided that the plane of light is perpendicular to the propeller disc With the aid of the photographic apparatus a picture of the profile line e is obtained By taking a series of pictures in a radial direction a number of half profiles can be obtained which can be completed by reversing the propeller and taking pictures of the other surface from the same positions The use of the photographic plate, upon which the profiles show up sharply against the light background, follows the above procedure

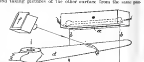


Fig 2 Determining a propeller profile by the photographic method

In order to get the true shape of the profile, it is necessary to know the angle the camera axis made with the propeller disk and the distance of the object from the lens Since it is easy to include a millimeter rule in the photographs or to measure the true length of the chord of one profile, one "shot" of each profile is enough to determine its true shape and size.

The described method of measurement was inspired by a report of a test in "The Towing Basin Laboratory" of Vienna. where the experiments on "A plane of light as a cutting

means" were performed by Professor Shaffernak, head of the establishment, to determine lines of flow This method is especially good for determining the profile form of model airfoils and similar models such as are used in aerodynamic laboratories, in order to avoid small deformations of the delicate models and to obtain a higher precision of measurement than has yet been attained by other methods.*

The knowledge of the flow of the surrounding medium in the immediate neighborhood of a body causing resistance is important for determining the most favorable form. By the use of chemicals in gaseous or liquid form, it is possible to make the lines of flow appear on the surface of a body If lead carbonate and a solution of sulphur dioxide in water are allowed to react, lead sulphide, which is dark brown or black in color and which is easily distinguished from the pure white color of the lead carbonate, is formed If we allow the two reagents to come in contact in such a manner that they only react in certain places, we will obtain dark spots on a white background.

Reproducing Lines of Air Flow

The experiment is performed in the following manner the resistance body to be tested, for instance, a model airfoil, is painted with a thin coating of lead carbonate, and by means of a series of very small tubes, sulphur dioxide is allowed to flow from the surface of the body If a model prepared in such a manner is placed in a wind tunnel and the gas allowed to flow out, the lines of flow will become dark in color against the white background Fig 3 shows the pressure and suction sides of a propeller blade which were tested by this method In explanation of the pictures, it may be said that

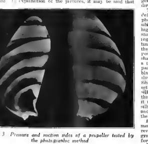


Fig 3 Pressure and suction sides of a propeller tested by the photographic method

the gas was liberated from holes near the leading edge and and that the model was clamped at the lower edge shown in the picture, which accounts for the distortion of the streamlines in this region The method can also be used for high speed work, since the model propeller 700 mm. in diameter ran at 1500 r p m

The use of the flow lines was made possible by the aid of photographic measurements, for the easily rubbed off lead carbonate would not permit actual measurement. Besides, the time required is less, since the model can be set up for a new run immediately after the photo is taken

A further example of how photographic measurements can be used in making aerodynamic measurements is in determining the deformation of a propeller blade in rotation. The blade of a propeller is deformed by the air force upon it and by the force which is due to its mass. The power absorbed depends upon the form, the aerodynamic qualities of the profile and the size of the blades. Every change of position from the original causes a change in aerodynamic qualities. A knowledge of the amount of deformations is therefore very important, for the designer must allow for them in laying out the propeller shape, so that the propeller performance will be constant over as great a speed range as possible It is clear that during the operation of the propeller it is dangerous to approach it and therefore very difficult to make direct measurements

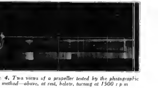


Fig 4. Two views of a propeller tested by the photographic method—above, at rest, below, turning at 1500 r p m

The problem is then to obtain a clear photograph of the deformed propeller blade which can be used as a basis of photographic measurements At first thought it seems possible to take a snapshot of the revolving propeller, but the high peripheral speed of about 450 ft./sec precludes both the snapshot and the flashlight. The problem was solved by taking not one, but many superimposed photos by means of a timed system of lighting, which had to be synchronized so that the single pictures were exactly the same. This was made possible by the use of a magneto coupled to the propeller shaft The electrical current of the magneto was sent through a tube containing mercury vapor which was so set up that a part of it was screened from the camera by the propeller blade In addition, this mercury vapor tube was moved slowly parallel to itself and to the propeller blade, so that a ribbon of light made up of separate lines occurred A camera set up opposite the mercury vapor tube photographed the silhouette of the propeller blade, as shown in Fig. 4. In this photo is shown the stationary propeller blade and below it the same blade turning at 1500 r p m The photo of the silhouette is sharply outlined up to the tip, which vibrated badly during the test and also caused the sound emitted during the run

Both of these uses of photography for propeller measurements held good only for one condition; a given number of revolutions per minute at a given speed of flight. The photograph included a scale which gave the true amount of deformation

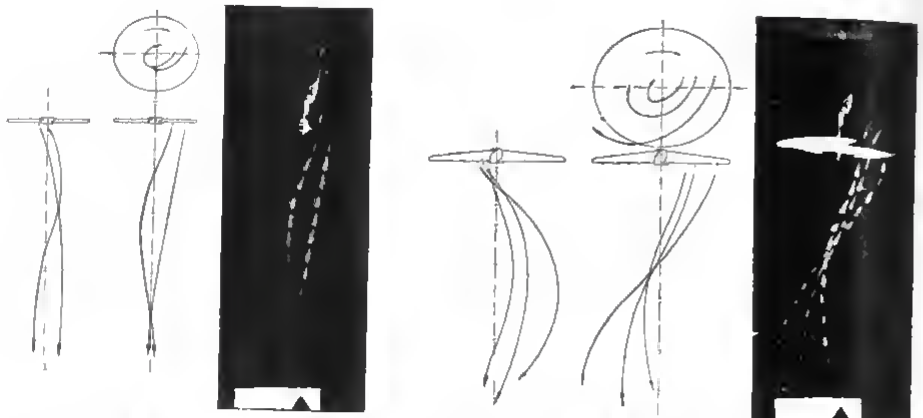
In the five following examples the science of making photographic measurements will be further described

Photographing Wing Deformations

First the experiments on the determination of the deformation of a wing truss during sand loading deserve mention. Even though the modern technic of the Theory of Structures, under which the strut and wire structure of an airplane can be treated, has advanced greatly, it still is necessary to test the accuracy of calculations For this reason, during the war, an example of every new type of airplane was tested to destruction, that is, the airplane was loaded with sand in a manner to represent the air loads which occur in flight, the load being progressively increased until rupture of the structure occurred A comparison of the actual failing load and that calculated gave an indication of the accuracy of the method of calculation

It is important that the load shall not be increased too

*Ed Note. It seems very doubtful if the precision of measurement on a straight model airfoil would be equal to that obtained by the use of a dial indicator in a milling machine



Figs. 5 and 6. Slipstream photographs of two different forms of blades, with diagrammatic sketches showing geometric reproduction

slowly, wherefor it is undesirable to undertake to measure the deformations of the main members in a slow manner. The gaining of speed in direct measurement requires well-trained personnel and costly apparatus. In this case photographic measurement offers an easy and reliable method of obtaining results. Since it is a question of dealing with large structures it is necessary to have two positions of the camera.

Further Uses of Test

Such a test can be very useful not only to check up calculations but also to determine the load on an airplane's wings while in flight. It was therefore desired to check up the sand load test in respect of the amount of the load. It is possible to determine the amount of loading indirectly by measuring the deformation which occurs in flight and calculating back to get the load which caused the deformation.* The determination of the deformation of the wings must of course be made in free flight, and measurement by photographic means is the only available method of solving the problem.

To lighten the work of obtaining the results from the photographs, easily distinguished marks are glued to the main members of the wings, such as the spars, the struts, the ribs, the leading edge and the trailing edge. The photo must naturally be taken with a very short exposure.

Since in an ordinary airplane it is not possible to take the two required photographs, which must be taken at the same time, from two widely separated positions, it is best to use a stereocamera. The accuracy of the result is sufficiently high if the points to be measured are not too far from the camera, so that the angle of intersection of the light rays b and b_1 (Fig. 1) is not excessively small. The test flights which have been made show that the loads now used are too high, and that for high angles of attack the loading at the wing tips is very light.

In helicopters, the required lifting force is produced by imparting to the slipstream the greatest possible velocity. Every component of velocity of the air particles but that perpendicular to the propeller disc is wasteful of energy. In practice it is impossible to eliminate other components entirely, a rotary velocity always being imparted to the slipstream. The best propeller is one having the least rotation of the slipstream for a given axial velocity. It was therefore desired to make the direction of the slipstream behind a propeller visible and to measure the path of the air particles accurately. This was done by introducing light pieces of woollen thread in the propeller inflow to indicate the direction of the slipstream velocity. By using a large number of these threads whole stream lines were made visible, as shown in Figs. 5 and 6 for two different forms of blades. On one two stream lines are shown, on the other three. The geometric reproduction and measurement of the curves was made with the aid of photography and the results are reproduced in the line drawings of Figs. 5 and 6. From the pictures the superiority of the propeller in Fig. 5 is clearly apparent, as that in Fig. 6 imparts a much larger rotational velocity to the slipstream.

Analysing the Flight Path

The most noteworthy use of photographic measurement was found in the analysis of the flight path of aircraft. As in most of the previous examples, the photographic method is the only one that the aerodynamic investigator can use here in testing the correctness of his theoretical deductions.† In a complete analysis of aerodynamic behavior, next in importance to a knowledge of the body's shape and the position of its center of gravity is the determination of the direction and velocity of the relative wind. It was formerly impossible to determine the direction and velocity of the relative wind of airplanes in free flight, the determination of the direction wind being especially difficult.

The history of the solution of the problem is a long story. First it was necessary to determine the flight path of an airplane which passes through known instantaneous positions in space. Next it was required to obtain the velocity of flight in some way or other so as to get a time scale on the photographs.

To get the flight path as a continuous curve, the test flights had to be made in the dark and a source of light was installed in the airplane, the motion of which registered as a line on the plate. Since it was not only desired to get the flight path but also the position of the airplane at every point on the path, the specification of the curve for one point was not enough, for at least three positions were required. The relative position of these points must naturally be known. On the photograph there are thus three paths of light side by side to be used in determining the path of flight and the position of the airplane. It is necessary in addition to determine the speed along the path, and this was done by ascertaining the distance covered during a given time. To accomplish this the shutters of the cameras, of which at least two were required, were operated so that a continuous trail of light was photographed as a series of dashes. The distance from one dark spot to another corresponded to a given length of time.*

Since the true length of the flight path covered is easily obtained from the photographs, the speed along the flight path can be found from the distance covered in unit time. Besides, the use of interrupted curves had the further advantage of simplifying the determination of the identification points used to join the photographs.

The Measuring Camera

In spite of the fact that valuable results were obtained by the use of this method, it was desired not to have to carry out the test flights in darkness and also to avoid inconvenient preparation of the airplane, such as the installation of the electric lighting apparatus. This problem was successfully solved. Apparatus was set up which caused only a local illumination of the plate, although the shutter was entirely open. This consisted of an opaque plate which contained a hole 20 mm. in diameter and was placed some distance in front of the shutter. If this screen is placed in front of a camera a disc of light, giving a hazy picture of the hole in the screen will fall on the plate and the surrounding part will remain dark. If no object is placed before the camera, only those parts of the object from which the light rays can pass through the screen will be projected upon the plate and the remaining part of the plate, being unexposed, remains sensitive to light for later use. If the body which is being photographed moves, more than one exposure can be made on the same plate, provided the screen also moves so that the light rays from the body can pass through the hole in the screen to the lens.

The actual apparatus consisted of the usual measuring camera placed close to an ordinary camera which was equipped with lens and shutter (Fig. 7). In front of both shutters O_0 and O_1 a screen, having two holes g and h, was placed so that the shutter was half way between the screen and the plate. This screen could easily be moved to the right or left, upward or downward by means of the handle b. Besides, the measuring camera was equipped with a rotating shutter s which had an opening s. In using this arrangement, an observer watched the image P_0 on the ground glass m, and moved the screen so that the image of the airplane remained always in the center of the image of the hole g in the screen. It was found possible by the use of this method of procedure to project a number of images P_1 successively on unexposed parts of the photographic plate. The result of such a run for straight flight and for curved flight is shown in Fig. 8.

This method has many advantages, since it offers not three, but an infinite number of points from which to take measurements. By means of this method all details of the flight attitude can be accurately calculated. Besides, the photographs furnish a permanent record from which measurements can always be made.

In concluding, one more interesting use of photographic measurement may be mentioned. This is the problem of accurately determining the volume of a non-rigid airship. Several photographs of the inflated gas bag are taken from different positions and these are used to determine the form of the stretched fabric, from which the volume is computed.

*Ed. Note.—An alternative method involves the use of recording instruments such as have been developed to a high degree of perfection by the National Advisory Committee for Aeronautics, mounted on the airplane itself.

†Ed. Note.—The uncertainty of the elastic properties of wood and their dependence on time cast a shadow of doubt on the validity of this procedure.

†Ed. Note.—This method is closely similar to that used for the analysis of bomb trajectories at Langley Field in 1918 by Dr. A. Wilmer Duff.

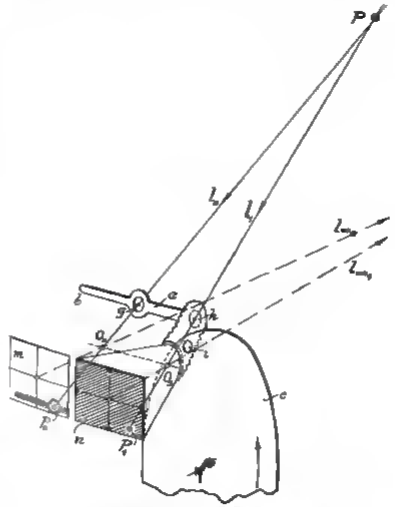


Fig. 7. Diagrammatic sketch showing principles of measuring camera

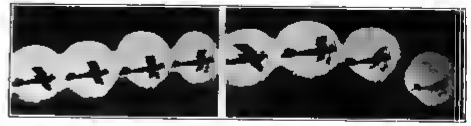


Fig. 8. A run of photographs showing an airplane in straight and curved flight

Amundsen to Try Again

Capt. Roald Amundsen, the Norwegian explorer who was the first to reach the South Pole, disclosed in a recent interview his new plans for an airplane flight from Spitzbergen to the North Pole and from the Pole to Alaska, with the object of discovering a continent or a great archipelago supposed to lie in the million square miles of Arctic which remains unexplored.

The plans of the Norwegian discoverer which failed a year ago because of financial obstacles, have been revived through the efforts of Lincoln Ellsworth, an American civil engineer and explorer who was an Army pilot during the late war. Mr. Ellsworth, his family and friends are said to have furnished $100,000 for the expedition. It is expected that three planes will take part in the flight.

The aspect of an international race is given to the proposed flight by cables from Tokio announcing that Haakon H. Hammer of Seattle, the former associate of Amundsen in this project, has interested the Japanese Government in a proposal to carry the Japanese flag into the North Polar region.

"We will start from a bay in North Spitzbergen next June," said Captain Amundsen. "We expect to have a party of twelve men in the flight. We are not quite sure that we will be able to take three planes, however. We may have to start with two. We will use the Dornier 'Whale' planes which are made in Italy. Each has a cargo capacity of 5,000 lb. The time from Spitzbergen to the Pole should be seven hours. The total flying time from Spitzbergen to Alaska should be twenty-one hours. Several hours will be spent making observations at the Pole."

Progress of Civil Aviation in Great Britain

British Civil Transport Aircraft in 1923-24 Flew 1,000,000 Miles Carrying 15,000 Passengers and 427 Tons of Goods

The Annual Report (Apr 1, 1923—March 31, 1924) of Maj Gen Sir Sefton Brancker, Director of Civil Aviation in England, gives a most interesting official picture of the progress of civilian aeronautics in Great Britain

The report gives in detail the results of the last year of operation of the four separate British air transport companies and the organization of the new Imperial Airways Limited which merges these four companies

The Imperial Airways undertakes to complete during the first four years an average minimum of 1,000,000 mi, with a minimum annual mileage for any of these years of 800,000 mi, and of 1,000 000 mi per annum thereafter until the $5,-000,000 subsidy advanced by the government shall have been repaid

Review of Non Subsidized Services

Among the civilian activities which are mentioned are the de Havilland Aeroplane Hire Service which has carried out flights to practically every country in Europe, and flown a total of over 165 000 mi The fleet of this firm has been increased from 8 machines to 15 machines In addition reference is made to the new DH50, which obtained first prize at Gothenburg last year, and which has since been doing other good work and made some excellent flights.

The Savage Sky-writing Company operated a fleet of 18 single-seater machines, and had a further nine machines under construction The report points out that most of the work took place in the United States, where 2,250 hr flying on actual sky-writing work was carried out

By way of an example of the rapidity and economy of aerial photographic surveying is quoted the survey of the Irrawaddy Delta by air In the United Kingdom Aero Films, Ltd, have carried out over 120 hr actual flying during aerial photographic work, and have added to their stock more than 10,000 general views. This company were officially appointed by the British Empire Exhibition to record periodically the progress of work on the exhibition buildings, and were also appointed official aerial photographers during Derby Day and Epsom race week, 1923

The Central Aero-Photo Company have also made steady progress in the work of photographing factories, estates, etc.

Experiments in night flying were planned, but had to be abandoned owing to financial stringency

Training and Licenses

The section dealing with licenses shows that during the period under review 63 new pilots' licenses were issued, and 221 were renewed, the number current on March 31, 1924, being 135 It is interesting to note that 117 new airdromes were licensed and the license renewed for 17 The number of new aircraft registered was 113, and the number of new airworthiness certificates issued was 112

On the training of Reserve officers the report states that of the four schools established, the de Havilland school trained 97 pupils, the Bristol school 70, the Beardmore school 48, and the Armstrong Whitworth school 30, giving a total of 245 pupils trained at the four civilian schools.

Development of New Types

A considerable amount of interesting information is contained in the section dealing with technical services. Thus the report states that two types of three-engined machines are under construction and two more in the design stage Of the two former, one is the Handley Page W8F, while the other is an all-metal machine, designed for long-distance flights, up to about 2,000 mi, on the Imperial air routes The two experimental three-engined types in the design stage will both be constructed, in the first instance, of wood As they are being designed to a specification for machines suitable for transport in the Middle East, later types can be built in metal, should the experimental types prove successful. One of these machines will be fitted with three Bristol "Jupiter" engines, and the other with three Siddeley "Jaguar" engines. Two new experimental single-engined types, suitable for cross-Channel services, are also under construction. One will be fitted with a Rolls-Royce "Condor," and the other with a Bristol "Jupiter" It is stated that one of these machines will be fitted with a Handley Page slotted wing, and the other with the de Havilland automatic flap gear.

The Supermarine twin-engined amphibian has been successfully flown, and will shortly be put into commission A sea plane of special type, intended for long-distance flights is being produced by the Fairey Aviation Company Fitted with a Rolls-Royce 'Condor," it will carry a crew of five, and will have a range of about 1,700 mi. in still air

On the subject of aero engines, it is interesting to find the statement that "Particular attention has been paid during the year to the construction of engines with cylinders fitted with sleeve valves, especially with a view to obtaining greater reliability and obtaining engines more suitable for civil aviation Two complete engines of 450 hp, incorporating this feature, are now under construction" Considerable advance has been made with the compression-ignition engine using heavy oil

Half-scale tests of the "Leader Cable" device for landing in fog carried out at the Royal Aircraft Establishment have given promising results Among aircraft instruments which have been undergoing tests, the Sperry, Reid, and Shilovsky type turn indicators have been found to give good results.

Investigation of Accidents

Apart from trivial occurrences not calling for special investigation, a total of 26 accidents occurred during the year ending March 31, 1924 Six accidents resulted in the loss of life, but only one of these involved passengers, the other five having occurred during "solo" flights for the purpose of test, competition or private flying With the exception of the one fatal accident, which occurred on an established air route, no persons carried in an aircraft registered in the British Islands and flying for hire or reward were injured to any serious extent Out of the total of 26 accidents a broad classification indicates that 13 were due to an error of judgment on the part of the pilot, 2 to defect in aircraft structure or controls, 9 to defects in engine or installation, 1 to weather conditions, and 2 to other causes Of the 13 accidents ascribed to an error of judgment on the part of the pilot, 2 occurred on the air routes, none in the subsidized services, 6 on short passenger flights, 1 during a competition, 1 at a school, and 1 in a "private enterprise."

Statistics of Air Transport

During the past year the total air transport flying amounted to 1,004,000 mi flown in 5,012 flights, as against 778 000 mi in 4,000 flights in the previous year. Passengers carried in the course of these flights numbered 15,013 (as against 11,480 in the previous year), and goods carried totalled 427 tons (as against 216 tons). These figures are all the more satisfactory in view of the fact that the Hambling Committee's report, which was published in February, 1923, recommended the winding up of the existing air transport companies. Its publication lessened the intensive effort brought to bear on obtaining fresh traffic

Other flying (mainly "joy riding") amounted to 120,000 mi flown and 39,227 passengers carried (as against 109,000 and 25,253 respectively)

British companies received a still larger proportion of the total passenger traffic on the cross-Channel airplane routes. The British share during the past year was 79 per cent, as compared with 76 per cent in the previous year. It is satisfactory to note that this increase was not the result of a proportionately greater number of flights, the British flights remaining at the previous year's figure of 58 per cent.

Imports and exports by air during the year reached a value of £881,233, bringing the total from August, 1919, up to £3,410 242 It should be borne in mind that the annual increase in goods traffic is less marked when the value of goods is considered than it is when the weight is taken as a basis, since the heavy traffic in newspapers is unrepresented in the former case, and, further, the general freight being carried to-day is not confined to light and valuable merchandise, but includes many large consignments of a bulky nature.

An indication of the efficiency of British air transport is given in a table, wherein it is shown that at present the average efficiency of the British services is about 91 per cent in the summer months, 82 per cent in the winter months and 88 per cent for the whole year A flight is regarded as "efficient" if completed within the time limit allowed under the subsidy scheme from the scheduled time of departure.

That the average rate of 88 per cent is lower than the figure of 92 per cent previously recorded for the London-Paris route alone is attributed to the greater distances flown and the shorter operating experience on the London-Cologne and London-Berlin routes.

The causes of involuntary landings on the regular services are analyzed. An average of 9 per cent of the flights commenced were interrupted through various causes. Of these interruptions more than 60 per cent were due to weather and about 25 per cent to mechanical defects, interruptions caused by weather varying from about 50 per cent in the summer months to about 70 per cent in the winter months

Table V shows the accident rates for civil aviation During the year under review one fatal accident occurred in air transport flying on regular services, and one non-fatal accident, in which no passenger was injured, occurred in "other flying for hire" The fatal accident recorded is the first which has taken place since 1920 involving loss of life to passengers travelling on the regular air routes.

Air Policy Suggestions

Two more points of view that make additional suggestions or criticisms, have been received with regard to the suggested National Air Policy

One writer requests that his name be withheld His comment is as follows:

"Mr Loening objects to centralized purchasing and wants all departments of the government 'such as the Ordnance Department and the C W S' to 'purchase their own airplanes exactly as they now purchase their own motor trucks.'

"His statement is correct save for the fact that Ordnance and Chemical Warfare do not buy their own trucks. According to the best information available, the Quartermaster Corps furnishes all the transportation for all branches of the Army, and would, if any more trucks were needed, do all the purchasing

"To the onlooker, it would seem that the best combat plane is the best combat plane and that the best combat plane would be the best for the Navy as well as for the Army. And while this standard best type for this class of work was being used in service, the scientific bugs could be working on improvements."

Then Arthur Halstead of The Bureau of Standards has two very excellent suggestions to make. He writes

"AVIATION'S National Air Policy campaign is splendid Not one of the items can be criticized, although some may possibly be bettered under discussion As for instance, the leaving of the procurement of aircraft and their equipment to the various agencies involved, such as, the Forest Service, the Weather Bureau, Coast and Geodetic Survey, Post Office Department, etc

"Under the heading 'Commercial Aircraft Operation,' the 'government subsidy' mentioned may prove to be the establishment of organized airdromes and airways in connection with federal services, such as the Air Mail

"If additions to the items mentioned in the 'National Air Policy' are in order, I would suggest adding under the heading 'Commercial Aircraft Operation' the following:

"A continuing organization, including representatives of all important points of view in aeronautics, for the discussion of standards for aeronautics where standardization is desirable.

"I do not feel that the subject of light airplanes and soaring flight has been given sufficient importance This seems to be a means of bringing aviation to high school boys and college students. I doubt if there are any other means so economical of bringing about the development and commercial use of aeronautics as to make it possible for high school boys and college students to play with it. (Radio development is analogous.) A college glider, entered in a series of contests, will induce the same college spirit and better publicity than a baseball team. I would, therefore, add under the heading 'Commercial Aircraft Operation' an item as follows:

"The encouragement of organized gliding and soaring contests, especially interscholastic."

Influence of the Form of a Wooden Beam on its Stiffness and Strength—III.

N.A.C.A. Report No 188

This publication is one of a series of three reports by J A Newlin and O W Trayer prepared by the Forest Products Laboratory of the Department of Agriculture for publication by the National Advisory Committee for Aeronautics. The purpose of these papers is to make known the results of tests to determine the properties of wing beams of standard and proposed sections, conducted by the Forest Products Laboratory and financed by the Army and the Navy

The purpose of this investigation was primarily to determine the stress which would occur at maximum load It was found that this stress is dependent not only upon the ratio of bending and compressive stresses but also upon the stiffness of the member, therefore upon the slenderness ratio The investigation also involved a consideration of the variation of maximum stress and particularly of the fiber stress at elastic limit

In actual tests the maximum stress was, in general, considerably higher than the straight line assumed by the Army and Navy and the stress at maximum load somewhat below

In some cases the stress at maximum load may be considerably below the straight-line relation generally assumed for maximum stress. However, when stress values from the two curves are taken for any ratio of bending unit stress to total unit stress and placed in the ordinary formula the estimated loads are not reduced proportionally

A maximum load chart for members of any length and with any form factor was made for Sitka spruce at 15 per cent moisture The analysis in this report will show how, for other species similar charts may be prepared

A copy of Report No 188 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D C

Air Mail Carries Valuable Cargoes

Millions of dollars each week are being sent from Kansas City to New York and other Eastern cities by Air Mail

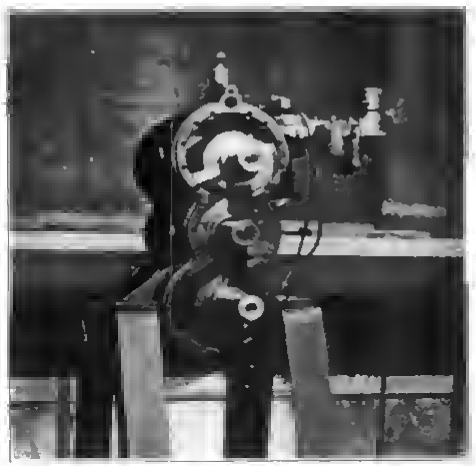
The use of air mails for the transfer of money, according to the officials of the Commerce Trust Co, results in the saving of thousands of dollars in interest that would be lost if the transfers were made by train The bank forwards daily a letter containing all New York checks of $1,000 or more The amount varies from $500,000 to $2,500,000 in each letter

While the Federal Reserve Bank has not yet adopted the use of air mail, many other Kansas City banks make all transfers to cities along the air routes by the more modern method

The safety of sending money shipments by air, also appeals to bankers and insurance companies. This factor they say makes it a desirable medium even to such points as St Louis, Chicago, Cleveland and Cincinnati, only an overnight run from Kansas City by train

New Type of Motor

The fundamental idea involved in the motor illustrated herewith is extremely simple. Imagine the inside of a thin drum or cylinder closed at both ends by a flat plate. Into this is fitted a solid drum of the same length but of smaller diameter. This drum rotates on a fixed axis inside the cylinder, but the axle is so placed that the outside of the drum's circumference touches the inner circumference of the cylinder at one point. The resulting chamber is divided by a



The Bill engine, as it was exhibited at the Wichita air meet

slide which runs through the center of the drum. This slide is split inside the drum and as the drum rotates it, it moves in and out so that its two ends are in constant contact with the inner wall of the cylinder.

Picture the point in the rotation of the internal drum where one end of the slide which runs through the drum touches the inner wall of the cylinder at the same point as the drum touches the cylinder wall. As the drum rotates the slide moves away from this point forming an enlarging chamber between itself and the point where the drum touches the inner circumference of the cylinder wall. This forms the suction stroke.

As the drum rotates, the slide reaches the point farthest away from the point where the drum touches the cylinder wall and hereafter the chamber decreases in size until the slide has again touched the point where it and the drum touch the cylinder wall at the same point. This is the compression stroke.

Thus, as the drum rotates, the chamber on one side of the slide is enlarged and the chamber on the other side decreased. Thus there is a suction chamber on one side and a compression chamber on the other side. Fixed ports in the inner wall of the cylinder are so arranged that the suction side connects to the carburetor and the compression side leads to a mutual compression chamber. Actually there would be three chambers formed most of the time as the slide runs right through the drum, making contact with the inner wall of the cylinder in both its ends, and the drum also makes contact with the cylinder wall. However, the inlet port at certain times connects two of the chambers making them into one.

Now to proceed to the application. There are three cylinders with internal drums connected by internal gears so that the drums rotate in unison. The upper cylinder functions as above described, sucking in gas on one side of the sleeve and compressing it on the other. The compressed gas goes into the central cylinder, in which the small internal drum is not offset, instead, the axle corresponds to the axis of the cylinder. As the circumference of the internal drum is less than the inner circumference of the cylinder there is a chamber formed. This chamber is divided into two parts by flanges projecting from the drum. As the gas compresses in the upper cylinder it is led into one of these chambers. When the compression cycle in the upper cylinder is completed, the drum in the central cylinder has rotated sufficiently to close the port to the upper cylinder. As the chamber of compressed gas in the central cylinder rotates, it opens out through a port to the cylinder wall to the third or lower cylinder. This lower cylinder is built on the same principle as the upper cylinder. The chamber on the side of the slide which formed the suction stroke in the upper cylinder is now, however, driven around by the explosion of gas in the central compression chamber. When the gas has reached its maximum expansion, the slide has rotated sufficiently far to come to a port fitted in the circumference of the lower cylinder out of which the gas escapes or rather is driven by the decreasing size of the chamber.

The advantages of this engine are several. First, the gas is allowed to expand to the maximum degree in the explosion chamber. Then, the force of the explosion is directly rotational and not indirect, as when utilized through a crank and connecting rod. Besides, there are no reciprocating parts, except the slides which are very light. Also the mechanism of the motor is extremely simple. Finally, the power is derived from the lower cylinder and there is little strain on the gears.

The motor is called the Bill Motor, the name being made up from the initials of the four men behind it, namely, E. E. Bidwell, Walter E. Innes, W. H. Lassen, and A. H. Lassen all of Wichita, Kan. The idea was originated some ten years ago, since which time four motors have been built, the last one having been run some 75 hr. The inventors claim that they have solved the difficulties of making tight connections and of the free movement of the slides. No information is available as to the horsepower actually developed or the r.p.m., but the motor is shortly to undergo laboratory tests.

Wright Aero. Corp. Dividend

In the Nov. 17 issue of AVIATION it was stated that the board of directors of the Wright Aeronautical Corp. of Paterson, N. J., had declared a dividend of 25 per cent per share on the outstanding capital stock of the corporation.

Charles A. Lourraine, vice president of the corporation, calls our attention to the fact that the actual amount was 87 cents per share, which could easily be misunderstood as being a 25 per cent dividend, but this is far from the case.

P. & A. Photos

Rear view of the Short light flying boat, fitted with two motorcycle engines, which was recently tested at Rochester, England

AIRPORTS AND AIRWAYS

Long Island News

The Great Air Mail Robbery" is overpaying the center of attention in Long Island. The story, one of thrilling interest in many adventures, is being filmed for the Arcadia Productions Co. of Philadelphia. In all nine planes are being used. The "Air Mail ship" is represented by a DH6, commonly called a "Clutching Hand"; the fighting planes are a Hanriot and a Nieuport flown by Captain Nungesser and Lieutenant Weiss, and there are also a couple of planes with German crosses painted on them which are brought down in flames. These planes are fitted with smoke pots which are set off by electricity, whereupon the plane then goes into a tail spin. The effect is so realistic that Mitchel Field one day sent out a plane to find out who had crashed. The camera men shot both from the air and from the ground. The planes shot at the ground cameras and on a couple of occasions the camera men fell flat on the ground thinking that they were going to be hit by the ships.

Phillips and Lewis who recently graduated from the Curtiss Exhibition Co. School flew from Garden City to Pinehurst, N.C. The machines used were Jennies, which are presented to each graduate of the school. The policy of the company is to send along an instructor when the graduates fly back to their home field. Arthur Caperton, who is a pilot at large, accompanied Lewis. Phillips followed by himself. The fliers reached Pinehurst in two days and made six stops on the way.

The other day a Jennie came in to Roosevelt Field from Philadelphia. Upon inquiry it was discovered that the flier had had four hours' instruction two years before, though he made quite a creditable landing. However, two of the longerons in the fuselage were found to be broken and five of the lift cables had twisted wire instead of turnbuckles. Please page the anti-air legislation enthusiasts.

Cleveland News

By Cy Caldwell

After 1064 hr. in the air since its last rebuilding, Air Mail Plane 99 has been flown to the Repair Depot at Chicago for general overhaul. The plane made its first trip between Chicago and Cleveland five years ago, since which it has piled up a record of over 4,000 hr. in the air and traveled some 400,000 mi., or sixteen times around the earth at the equator.

These amazing figures are taken from the plane's log-book by H. B. Shaver, Assistant Superintendent of the Eastern Division, Air Mail, and perhaps constitute a world's record for any type of airplane.

Pilot Warren D. Williams must be given credit for old 99's record, for the plane has never been flown regularly with mail by anyone other than himself. And as he has never had a forced landing due to mechanical troubles, the Air Mail's excellent ground organization share the credit with him.

* * *

Jack F. Tuyls is in charge of maintenance of the Air Mail's night lights between Chicago and Cleveland. In his trusty Ford he bounds from field to field, inspecting and repairing lights, receiving the reports of caretakers at the emergency fields, and seeing generally that the Lighted Way is maintained for Uncle Sam's Riders of the Night Sky.

The installation of lights has been completed from Chicago to Vickery, Ohio, and will be continued to Cleveland very soon.

* * *

A recent visitor at Glenn L. Martin Field was Paul R. Redfern who has flown some 1300 hr. advertising a well-known cigar by dropping samples attached to individual paper parachutes. Redfern has covered Toledo, Detroit, Cleveland, Omaha, Dodge City, Minneapolis, its suburb, St. Paul, and dozens of smaller cities and towns.

It is an effective form of advertising and shows what strides have been made in educating the youth of the land since the late Victorian era, when I was a boy. In those days no one dropped cigars from the air, and I was therefore forced to satisfy my cravings for tobacco by that humble sport known as "shooting snipes". This system entailed some work on my part, but had the advantage of introducing me to a wide and varied knowledge of tobaccos which is of great value to me now in my declining years.

Pittsburgh (Pa.) News

By J. C. Wilson, Jr.

Armistice Day was a big day for the Aero Club in Pittsburgh. It started with a parade at 10 a. m., which was, to say the least, a huge success. After the parade, a luncheon was held at the Wm. Penn Hotel. Brig. Gen. Wm. Mitchell and Rear Admiral Gleaves were the guests of the Aero Club for the day. After the luncheon, there was a Tea Dansant at the Hotel Schenley. Both General Mitchell and Rear Admiral Gleaves attended together with about 150 members of our Club, (with wives and sweethearts). Following the dansant, the Aero Club held its annual banquet. General Mitchell and Rear Admiral Gleaves spoke regarding the Air Services. After the banquet, General Mitchell and Rear Admiral Gleaves were escorted to the American Legion Ball held at the Wm. Penn Hotel. This was a huge success.

The officers for the coming year were installed at the banquet by Col. Harry E. Frye. The following is a list of the officers and board of governors:

Officers—Howard B. Pearce, President; Joseph M. Slater, First Vice President; Joseph C. Wilson, Jr., Second Vice President; Robert E. Dake, Third Vice President; R. A. Tucker, Secretary; J. W. Donahey, Treasurer.

Board of Governors—Robert A. Lardiem, Royal B. Lee, Russell M. Hayes, W. J. Austin, Louis T. Barry.

* * *

Judge Evans handed down his decision last week on the ability of the City and County to purchase and prepare the flying field in favor of the Aero Club. The opposition has asked for a rehearing and we are still a long way from obtaining it.

General Mitchell inspected the flying field Nov. 12 and approved of it, as did General Patrick on his last visit here.

Iola (Kan.) News

The Ford-motored sport plane belonging to Paul Neff was somewhat damaged recently when the wind broke it loose from its tying place.

Aviator Clark, who formerly piloted Barber's Swallow plane, arrived in Iola from St. Joseph. He has been flying there this summer.

Harry B. Crewdson has sufficiently recovered from the injuries sustained in a crash here recently to be out ready to go again. The accident occurred when he attempted to land his Hisso-Standard plane on the local field after dark. The landing gear caught the top of a haystack, causing the ship to "nose" over. The machine was badly damaged but will probably be repaired. Mr. Crewdson has bought a Canuck which he intends to put into service soon.

Arnold E. Oren is building a light plane around a motorcycle engine. A Swanson Sport plane is now being assembled by a local flying enthusiast, and another young man at Chanute, a few miles south of Iola, is building a Dixie Flier.

Portland (Ore.) News

Portland, Ore., is to have a municipal airport under the Guilds Lake industrial project which has been undertaken by the Port of Portland Commission for the purpose of placing new industries on moderate priced sites and handling their shipments with economy in time and expense.

Baltimore News

By W. D. Tipton

New construction at Logan Field will be completed before cold weather prevents further work. The 29th Div. Air Service has completed the erection of two new standard steel hangars, 66 x 120 ft., with concrete floors and electric lights. Running water is also to be installed.

The National Guard Air Unit recently has issued eight new Curtiss JN5 planes to replace the existing equipment, most of which was over three years old. Four old planes were flown to Fairfield, and eight new ones ferried back by officers of the unit. The flights both ways were in formation. Two forced landings in the rough country between Cumberland and Moundsville were successfully negotiated on the way out.

Outdoor training maneuvers for the year will end Dec. 1, when the unit holds its weekly drill at its uptown armory.

Victor Dallin in front of the New Swallow on which he flew, in very bad weather, from Wichita, Kan., to Philadelphia, in 14 hr. 10 min.

The past schedule of Saturday formations at Logan Field was very successful. In October the unit ranged a battery of four guns of the 110th Field Artillery, Md.N.G. at Fort Hoyle, Md. The shoot went off smoothly after the reserve radio ship got going, and the four guns attained their target just before dusk. Capt. Geo. Cobb, Operations Officer of the Unit, was the observer and Capt. C. A. Masson, Flight Commander, pilot. The air unit furnished both ground radio and panel details for the artillery and had to move its equipment 15 mi., establish an advanced landing ground and set up radio.

On Saturday, Nov. 8, a combined Infantry, Artillery and Air Service problem in communications, organized by the Air Unit, was held at Logan Field. A battery from the 110th Field Artillery and two companies of the 5th Infantry, both Md.N.G., participated with the Air Unit. The attack was time scheduled. Artillery, infantry liaison, command missions were used. The attack simulated as far as possible actual warfare, beginning with a barrage of five minutes, followed by the infantry advance. Air Service troops simulated the enemy using pyrotechnics, smoke puffs, etc. The show began at 1:30 and lasted 40 min., during which time every type of Air Service mission was seen in action. Announcements to the crowd telling the details of the attack as it progressed were made through loud speakers.

* * *

Commercial activities at Logan Field have been fairly brisk. The Skyways Corp. has had a series of advertising contracts. It has just got out a new night flying machine painted solid black. It is a revised edition of a Canuck, using all upper wing panels, 6 in. more gap and other special control features, all resulting in a very low landing speed. It gets off with pilot, passenger and a 150 lb. load of batteries.

The American Aircraft, Inc., jobbers of aircraft supplies, are moving some of their stock. Orders indicate the laying up of equipment for winter overhaul.

* * *

Lt. L. M. Willinger of the Air Unit recently tested out a new design metal monoplane built by the Boyd Brothers. The machine is a semi cantilever monoplane of about 30 ft. span and is powered with a 60 hp. Anzani, which did not put out much more than 45. The machine has trailing edge flaps which gives it a wide speed range, 35-100 mi./hr., so one is told. It is designed to carry three people with an 80 hp. Anzani. It is understood that the construction of the fuselage is ash longerons with elliptical formers disposed along the fuselage, over which are placed duralumin sheets secured by machine screws tapped into the wood. The wings are covered in similar manner, the internal construction being ash ribs on duralumin spars.

* * *

Privately owned ships are very active. Sgt. I. M. Cooper keeps his Canuck in the air constantly. He started to New York a few days ago with a fare, but a rag which he carries in the engine compartment to wipe off his hands, got entangled with the air going into his carburetor and choked his engine. His friends now kid him about the $150 rag which let him down near Aberdeen. Maj. Temple N. Joyce is doing quite a lot of pleasure flying with his Morane-Saulnier AT, a side by side two seater monoplane with a 110 hp. Le Rhône. It is a beautiful flying ship.

The Toll of Wing Walking

Wing walking has once more claimed a victim. On Nov. 5 Clyde Horchem, one of the most daring and successful exhibition pilots and wing walkers in the country, was instantly killed when he fell from his plane at an altitude of approximately 1,000 ft. The tragedy took place near Pumpkin Center, between Tulsa and Drumright, Okla.

Jess Catron, student flier of Sand Springs, was in the airplane when Horchem fell. According to his story, he and Horchem, who was teaching him to fly, were on their way from Drumright to Tulsa.

"You are getting along fine. I'll let you pilot by yourself," Horchem is said to have shouted to Catron. The flier then climbed out of his seat to the top wing. He slipped, however, and slid down the fuselage of the plane and only saved himself from falling by holding on the rudder. The plane then went into a tail spin, out of control, Catron said, and fell for more than 500 ft. while Horchem was thrown off and crashed to earth. Catron managed to get the plane under control and landed without injuring himself.

Horchem's wife, Bertha Horchem, also a daring stunt flier, was killed in Texas last March, while looping.

Catron had only taken five or six lessons in flying before the accident. Tulsa aviators commented on the fact that he managed to make landing after the ship went out of control and its pilot was lost.

The previous day Horchem had thrilled thousands by his daring stunts at the Drumright air carnival.

"There's a man who by the laws of averages should have been dead years ago," D. A. McIntyre, Tulsa aviator, said to an acquaintance as he watched Horchem perform his stunts at Drumright. "He has escaped from a thousand situations that ordinarily mean death."

Horchem made his headquarters in Oklahoma City but he was previously a resident of Wichita, Kan. He was about twenty-six years old.

Swallow Agent Makes Fine Flight

Victor Dallin, who has just secured the sales agency for the New Swallow commercial plane for Philadelphia and surrounding territory, on Nov. 11 delivered his first ship by air from Wichita to his home, covering approximately 1400 mi. in 14 hr. 15 min. total flying time. Dallin ran into extremely rough weather in some states, and had to climb 6000 ft. to get above the clouds in crossing the Pennsylvania mountains, but he reported by wire to the Swallow factory at Wichita that the ship performed excellently throughout.

Our readers will remember the remarkable showing the New Swallow made at the Dayton and Wichita meets, where it was generally considered to be a real revelation in efficient low powered commercial airplane design. The ship is normally equipped as a three-seater and carries with a 90 hp. Curtiss OX5 engine a useful load of 700 lb. The high speed is 95 mi./hr. and the low speed 35 mi./hr. The gasoline supply comprises 35 gal., which is sufficient for 4 hr. flying with full throttle.

The Cup of Italy

The international touring plane competition for the Cup of Italy, which was recently put up by the Italian Air Department, was held at Rome, Oct. 11-12, last. The contest was limited to two-place tractor airplanes equipped with a single engine developing from 40 to 90 hp. and fitted with dual control. The contest load included fuel and oil for a flight of 300 km. (186 mi.), plus a pay load of 385 lb. A maximum low speed of 37 mi./hr., a minimum high speed of 62 mi./hr. and a climb of 3,300 ft. in 15 min. were also imposed.

The Macchi model 20 two-place sport plane (45 hp. Anzani) on which N. Briganti won the Italian touring plane competition

The competition was held over a 50 km. circuit around Rome. Of the eight entries received three, the Montorfano RT biplane, the Gabardini monoplane and the German Albatros did not participate. The remaining five entries included an Italian Macchi 20 biplane (45 hp. Anzani), a French Caudron C127 biplane (80 hp. Le Rhône), a German Udet U10 monoplane (55 hp. Siemens-Halske), and two of the new Junkers model T convertible mono-biplanes. One of the Junkers ships, fitted as a monoplane had a 55 hp. Siemens-Halske engine, while the other ship, rigged as a biplane, was equipped with a 75 hp. engine of the same make.

The Udet and the Junkers biplane were eliminated in the qualifying trials, both ships having failed to satisfy the minimum landing speed requirements. While these two ships subsequently flew in the race in an unofficial capacity, there were only three official contestants. The Macchi piloted by G. de Briganti, the Caudron piloted by the French pilot Bécheler and the Junkers monoplane piloted by the German pilot Plauth. The two Junkers ships both had forced landings owing to engine trouble and withdrew from the race, and as the Udet was officially out of the race, the contest became one between the Macchi and the Caudron. De Briganti's Macchi won the race, being awarded the first prize of 150 000 Lire, while Bechler's Caudron secured second place with a cash prize of 50,000 Lire.

Two of the new Junkers model T convertible mono-biplanes which took part in the Italian touring plane competition

The Macchi 20 is a comparatively old ship, having been built in 1920. It won the Mapelli Cup for sport planes in 1921 and 1922. Its general characteristics are as follows: Span 26 ft. 5 in., length 18 ft. 7 in., wing area 216 sq. ft., weight empty 583 lb., weight loaded 1078 lb., high speed 76.8 mi./hr., climb 3300 in 14 min., range 300 mi.

Third Lamblin Cup Contest

The third and last annual contest for the Lamblin Cup, which was donated by the famous French radiator constructor in 1922 for the encouragement of cross country flying by French military aviators, was won, as was briefly reported last week, by a Farman Jabiru transport plane piloted by Warrant Officer Hernu and Captain Philippe of the Technical Section of the French army air service. This is the same ship that won the last French Grand Prize for Transport Planes.

This year's competition was flown on a 750 mi. circuit from Le Bourget (Paris) to Istres (near Marseille) and return, which had to be covered between sunrise and sunset. The winner's elapsed time for this distance was 7 hr. 37 min., including half an hour's stop at Istres. The trip to Istres took 3 hr. 41 min., and the return trip 3 hr. 25 min., which is a remarkable testimonial to the reliability of the four-engined Farman Jabiru. The regulations allowed contestants to subtract one hour of their elapsed time for ships fitted with more than two motors and 5 min. per passenger carried. As the Jabiru carried a contest load equivalent to twelve passengers, the winner's time was reduced by two hours.

The Udet two-place sport plane (55 hp. Siemens-Halske) which took part in the Italian touring plane competition

Lieutenant Rabatel, winner of last year's Lamblin Cup, flying a Dewoitine pursuit plane, secured second place with a time of 6 hr. 13 min. Captain Battesti and Lieutenant Tourre, both on Nieuport-Delage pursuit planes (300 hp. Hispano-Suiza), were third and fourth respectively, with 6 hr. 23 min. and 8 hr. 33 min. Lieutenants Carrié and Faure, in a Breguet 17-2 (450 hp. Renault), were fifth with 6 hr. 50 min. Seven other contestants finished, but were out of the prize money. The slowest time was 8 hr. 12 min.

The four leading contestants all had Hispano-Suiza engines and Lamblin radiators.

Amsterdam-Batavia Flight

The 8000 mi. pioneer flight from Amsterdam, Holland, to Batavia, Dutch East Indies, which was attempted by the Royal Dutch Air Line ("K.L.M.") is meeting with considerable difficulties en route. The three "flying Dutchmen," T. van der Hoop, M. H. van Weerden Poelman, and M. P. A. van den Broke, left Amsterdam on a Fokker F7 (360 hp. Rolls Royce Eagle) at 8:30 a. m., Oct. 1 and arrived at Prague, Czechoslovakia, at 3:55 p. m. They left Prague the following morning for Belgrade, Yugoslavia. On the 3rd, they met with radiator trouble on the way from Belgrade to Constantinople, and were forced to land at Philippopolis, Bulgaria. In so doing the plane was very seriously damaged, so that it became necessary to have a new engine sent out from England.

The necessary repairs having been effected, the F7 proceeded on Nov. 2 to Constantinople, where it arrived safely. The following day the ship reached Angora, Turkey, the 5th Aleppo, Syria, the 6th Bagdad, Irak, the 7th Bushire, Persia, the 8th Bender Abbas, and on the 9th Karachi, India.

Human Air Mail Barred

After he had been decorated with $718.08 worth of air mail stamps in anticipation of an air mail trip to New York, Chester N. Weaver, a San Francisco automobile dealer, was "barred from the mails" by a ruling from Paul Henderson, Second Assistant Postmaster General.

Mr. Weaver was rejected as a piece of human mail when a telegram was received from Mr. Henderson saying that "nobody is to ride in air mail except department officials."

The telegram added that "sooner or later" it may be possible to carry passengers as part of the Air Mail Service.

UNITED STATES AIR FORCES

U. S. ARMY AIR SERVICE

Airship TC5 Makes Long Flight

Under authority from the War Department, the airship TC5 left Scott Field, Ill., for Tulsa, Okla., at 10 00 p m, Oct 9, for the purpose of attending the International Petroleum Exposition at that city The crew of the ship consisted of Lt. Col John A Paegelow, Commanding Officer of Scott Field, First Lts. William A Oray and William J Flood, Warrant Officer Robert E Lassiter, and one engineer and one rigger The ship carried 250 gal of gasoline.

After bucking strong head winds over the Ozark Mountains during the first night, the ship arrived off Springfield, Mo, about 7 00 a. m Oct 10, with 110 gal of gasoline left. The ship's commander decided to make a landing at Springfield and take on a further supply of gasoline Some difficulty was experienced in switching to the 110 gal tank, and it was necessary to cut the engines while repairs were being made. The ship naturally being light, took altitude and some helium had to be valved to maintain equilibrium In about ten minutes repairs were made, so the crew flew low over Springfield and called to a number of people to come out into a pasture and help land the ship A drag rope landing was then made without any difficulty

After taking on 150 gal of gasoline, the ship then proceeded to Tulsa, Okla, arriving there at 3 30 p m., without any incident other than backing head winds all the way The ship remained at Tulsa during the night, proceeded the next day to Wichita, Kans. to be present at the National Air Congress on the 11th and 12th At 10 00 a m, Oct 13, the TC5 left Wichita, arriving at Kansas City at 4 15 p m, where it took on more gasoline and arrived at Scott Field at 12 15 a m Oct 14

It is believed that this trip of 940 mi in 32 hr 30 min is the longest made by a non rigid airship, without having any mooring mast or hangar facilities en route Wherever a landing was made and the ship held over night, the advance officer, Capt Edmund W Hill procured sand sacks and moored the ship on the forward handling guys, using the sand sacks for anchors This arrangement worked very well and no trouble was encountered It was necessary to send Lieutenant Flood home by rail from Springfield, Mo, however, as the ship did not have sufficient lift to carry a tell tale crew on account of the helium valved there

It is interesting to note that Colonel Paegelow had the directional wheel on the airship for the whole trip, showing that a man can fly a ship on direction for 940 mi without feeling numb or effects from it

Army Air Orders

First Lieut Robert D Moor, A S, Kelly Field, to San Francisco, sailing Feb 18, 1925, on transport for Hawaiian Islands.

First Lieut Theodore J Koenig, A S, 96th Div Org Res., Seattle, to Non Div Group Org Res

Sec Lieut Paul Ehert, A S promoted to grade first lieut, effective Oct 5

Priv Michael Delaney, 5th Obs. Sqdrn, A S, New York City, to Mitchell Field

First Lieut. Frank B Tyndall, A S, to report to Chief of A S, for temp duty, and upon completion will sail on transp leaving San Francisco Dec 26 for Hawaii

First Serg William P Begley, A S, Langley Field, retired

First Lieut LeRoy A Wallhall, A S, Fort Bragg, to New York City, sailing Dec 12, via Govt transp, for Philippine Islands.

Each of following officers, A S, to stations indicated, effective upon completion of tour of foreign service First Lieuts. Newman R. Laughinghouse, Mitchel Field, Samuel O Carter, Langley Field, Kenneth N. Walker, Chanute Field.

Maj. Frank M. Kennedy, A S., Lakehurst, for temp. duty to Bolling Field, upon its completion to McCook Field.

Spec. Orders 213, relating to Capt. Reuben Benjamin Sleight, A S Off Res. Corps, revoked.

Staff Serg Leonard Court, Mitchel Field, transferred in grade of private to detached enlisted men's list.

Spec Orders 209 amended to direct First Lieut. Aubrey L Eagle, A S, Bolling Field, to proceed to New York City and sail March 4, 1925, via Govt. transp, to the Philippine Islands

First Lieut Levi L Beery, A S., on leave of absence, to report to Chief of A S for temp duty, upon its completion to proceed by rail from Washington to New York City, sailing on commercial steamer Nov 1 for Cristobal, C Z

Spec Orders 222, relating to First Lieut Orville L Stephens, A S, revoked

Spec Orders 225, relating to First Lieut. Myron R Wood, A S, revoked

Ever Equal to the Emergency

In the Panama Canal Zone an emergency flight was recently made to David, Panama, from France Field, in a successful attempt to save the life of the son of Mr and Mrs Hodges, who had been stricken with appendicitis. The father's appreciation of the services rendered by France Field is best described in an extract of a letter from him to Gen. Samuel D Sturgis, Commanding the Panama Canal Department, reading as follows

"The experience brings home in the most forceful manner the efficiency of the Air Service, the wonderful progress that has been made by its personnel in recent years in the entire field of aeronautics, and from the willingness of its members to perform any and all duties they may be called upon to perform, one can readily understand why the Air Service has the enviable reputation that it holds in the U S Army"

U S NAVAL AVIATION

Naval Air Orders

Lt. Comdr William Masek, det Nav Air Sta, Pensacola, Fla, to Aircraft Sqdn, Scing Flt

Lieut Clarence J McReavy, det Nav Air Sta Pensacola, Fla, to Nav Air Sta, Hampton Rds, Va

Lt. (jg) John B Cattermole (SC), det Nav Powder Factory, Indianhead, Md, to Aircraft Sqds. Battle Fleet

Lieut. Frank R Whitmore, det. Nav Air Sta., San Diego, Calif, to Aircraft Sqd, Battle Flt

Lt (jg) John M. Thornton, det U S S Arkansas, to Nav Air Sta, Lakehurst, N J.

Lieut. Hugo Schmidt, det, aircraft Sqds, Battle Flt, to Nav Air Sta, San Diego, Calif

Lt. (jg) Joseph F Bolger, Charles R Brown, Edward A. Maher, DeLong Mills, Edward P Moore, Max Welborn, and Ens William H Buyrer, det Nav Air Sta, Pensacola, Fla., to Aircraft Sqds, Scing Flt

Lt (jg) James B Carter, det U.S S Raleigh, to Naval Air Station, Lakehurst, N J

Lt. (jg) Daniel A Frost, det U S S Marblehead, to Naval Air Station, Lakehurst, N J

Ch Gun Joseph H Gerrior, det Nav Air Sta, Coco Solo, C Z., to U S S Melville

New Asst. Navy Secretary

Theodore Douglas Robinson was named Assistant Secretary of the Navy, Nov 11, to succeed his cousin, Col Theodore Roosevelt, who resigned his post to run for Governor of New York a few months ago

New Naval Air Cruiser

A metal flying boat capable of making 2500 mi. in nonstop flight has been contracted for by the Navy Department with the Boeing Airplane Co of Seattle, Wash., and is now under construction, the design having been approved by the Bureau of Aeronautics.

The new seaplane, known as type PB, will incorporate several departures in aircraft construction as practiced in this country, an interesting feature being the placing of two Packard engines in tandem so that when in the air one of the power plants may be shut down for minor adjustments without landing This arrangement is also expected to make for economy of fuel consumption at cruising speeds. The plane will for the most part be constructed of duralumin.

An interesting light is thrown on naval aircraft development when the characteristics of the new PB seaplane are compared with those of the historic Navy-Curtiss NC type which made the first trans-Atlantic flight in 1919 The weight of the NC was 28,000 lb and its range was in the neighborhood of 1600 mi The Navy PB has a full load weight of 24,000 lb and a range of nearly 1000 mi. greater. The NC's wing spread was 126 ft The PB wing span will be 87 ft. 6 in

Of the total weight about 10,000 lb will be carried as fuel, representing nearly 1700 gal of gasoline Five men will compose the crew of the new air cruiser There will be two pilots and mechanics and a radio operator The two engines will develop 1450 hp. at 1800 r p m

An interesting parallel to this development is under construction by the Navy Department in the so called PN9 The latter is an all metal flying boat which is a development of the F5L type The PN9 is designed for a cruising range of 2200 mi and will carry approximately the same number of men in the crew as the Boeing type It is the result of efforts to create a patrol plane of superior performance, based on the design which has seen such efficient service with the Fleet during the past four years in the annual maneuvers near Panama.

The first step in the development of the PN9 was the PN7 Two of this type cruised south with the Fleet during the last winter maneuvers and were reported to be greatly superior in performance to the older F5L types An improvement on this type the PN8, was next laid down. These two types were designed for comparatively short distance patrol work and the PN9 was next brought forward for long distances of 2000 mi and more. The first two types of the PN boat were powered with Wright "Tornado" (T3) engines while the PN9 will have two Packard engines.

The flying boat development for long distance patrol work which is being carried on by the Bureau of Aeronautics represents a different phase of Naval aviation development from the development of airplanes to operate from ships of the Fleet at sea. While the latter are designed to be carried on ship board and to operate from the ship's deck, the patrol planes might be termed the air cruiser, capable of negotiating long distances over water and operating from bases on land

Naval officers are agreed that possession of a few squadrons of flying boats of the type contracted for with the Boeing company would enable the United States to embarrass seriously the success of any surprise attack coming from a long distance if their mere existence would not serve to prevent an such attempt

The new planes, with ability to hop off unsupported from San Diego for Honolulu, would be invaluable as far-flung scouts in any critical period preceding an expected international crisis They would be able to maintain touch with the enemy and would delay it materially by a constant threat upon the enemy's line The sinking of one or more fuel ships or provision carriers would be sufficient, some officers hold, to force abandonment of any expedition which was 1,500 to 2,000 mi. from any available base

Carrying a step further their analysis of the effect of the new air cruisers some officers see in them at least a partial solution to the problem which was raised when the United States gave up under the arm limitation treaties the right to fortify Guam and the Philippines Observers here and abroad declared at that time it would be impossible for the United States either to defend her Pacific possessions or to conduct a defensive-offensive naval war in their vicinity because of the lack of a base.

Should the proposed auxiliaries come up to expectations, however, they would comprise an emergency naval force, practically independent of their continental base, and a ready supplement to the insular defense certain to embarrass any occupational plans as now drawn.

Employment of the ZR3

Plans for the employment of the airship Los Angeles (ex-ZR3) are being prepared in the Bureau of Aeronautics and will be the basis of recommendations to the Secretary of the Navy in the near future

Following the delivery flight to this country the Chief of the Bureau of Aeronautics appointed a board of officers headed by Capt. Emory S Land to inquire into and make recommendations on the employment of the new airship After careful consideration the board has made a report which has been forwarded to the officers at the Naval Air Station, Lakehurst, for further comment and recommendations

These recommendations will then be forwarded to the Secretary of the Navy for approval Practically every possible route for commercial airship operations which involve the use of existing facilities in this country, have been under investigation, but an definite announcement of scheduled flights will be made until they have been approved and authorized by the Secretary of the Navy

Trial flights with helium will be made Inflation of the big airship with helium gas is expected to start shortly Several carloads of helium were received recently at the Lakehurst naval air station Although it is insufficient to fill the ship, whatever additional gas is needed will be taken from the cells of the Shenandoah A German crew of eleven men will assist the American crew in handling the Los Angeles during the first few flights here

Commenting on suggestions that the Los Angeles be turned over to private enterprise, as she cannot be utilized for military maneuvers, Secretary Wilbur stated that such action could not be taken without an act of Congress. It is considered likely that when the Navy has completed a long series of tests with the ship under the direction of Government experts, the Los Angeles may be diverted for commercial use under some plan yet to be devised by the Secretary of the Navy and his advisers.

Secretary Wilbur has under advisement a recommendation made by New York engineers that the Shenandoah, as well as the Los Angeles, be dispatched on trans-continental flight with passengers aboard Such tests probably will be made Specific announcement was made by Secretary Wilbur that, whatever disposition might ultimately be made of the Los Angeles, the Shenandoah would be retained as a part of the naval service

Orders for the acceptance of the ship were signed Nov 10, and the Los Angeles accordingly will become the property of the United States following appropriate action by the Secretary of State The ship is valued by the Government $2,500,000, it is reported

Christening of ZR3

After a short test flight to be made by the ZR3 when she is filled with helium, it is understood that she will be flown to Bolling Field where Mrs. Coolidge will christen her the "Los Angeles" Both the President and Mrs. Coolidge, together with Secretary of the Navy Wilbur and other members of the Cabinet, are expected to attend the christening of the German-built airship

To Train in L.T.A.

The following named officers have been selected for training in lighter-than-air craft at Lakehurst, N J:

Lieut. J C Richardson and Lieuts. (jg) J B Carter, D A Frost, T B Hendley, W. I. Leahy, G. A Patterson, J M Thornton

Movements of Aircraft Carriers

The aircraft tender Aroostook is to continue as flagship and tender of the Aircraft Squadrons, Battle Fleet, after the arrival of the aircraft carrier Langley in the Battle Fleet.

BACKFIRES

We wonder just what the safety requirements of parachutes in the Republic of Latvia may be. And the more we wonder the greater our anguish becomes. For we are gazing upon the accompanying picture of a brave man holding on to a six foot parachute with one hand and airily waving a *fazzoletto* to the shouting multitudes while he cleaves the clouds. His air of utter abandon, together with his fetching costume, will be a true inspiration to all parachute enthusiasts.

But this also raises a serious question. Cy Caldwell, who supplied us with this rare document, is strangely silent about the reasons for his interest in this parachute. Can it be that an overwhelming sense of modesty and shyness seals the lips of its inventor? And lest we be misunderstood, we boldly ask: *Is Cy Caldwell the inventor of the Latvian parachute?*

No, Cy, *fazzoletto* is not a dish of the ravish family. It simply means handkerchief in Italian.

The Paris aeronautical expert of *The New York Times* is at it again. Just listen to this one, where he deals with "a new French device to end air crashes":

"When an airplane is forced to land because the motor gives out or falls into an airhole, it is under present conditions forced to come down, regardless of the nature of the ground, even when the pilot is fully aware that a smash cannot be avoided. Captain Lepinte's first appliance enables the pilot in such cases to right the plane and to pass over the obstacle, even if it is necessary to start flying again without landing at all."

One would think that a pilot whose motor had fallen into an airhole would be so confoundedly fed up with the world in general that he would not give a tinker's damn if his ship started to fly circles on its back around the obstacle and balked at it. There is a breaking point even to a pilot's equanimity.

A German official aeronautical publication, quoting Swedish press reports, states that military aircraft orders placed to the United States by the Japanese government will conform to English specifications.

Thus, of course, is great news to us. It remains to be seen whether these aircraft will be test-flown by Abyssinian pilots.

Penultimate closing note from one of our correspondents: "Yours till the parachute fails to open."

—ONE WING LOW

Publisher's News Letter

Readers of AVIATION may assume that the size of the paper is limited by the news that is available. If the volume of excellent articles and news that comes to the Editors' desk could be seen by our readers, it would be realized how difficult it is to select editorial copy that appears to be of the most timely interest and of the greatest importance. Some of our readers want more commercial aviation news, others more light plane data, while some wish to keep informed as to the aero-political situation in Washington. As every publication has to limit its size to a little more than twice the amount of advertising it receives, and as, at the present time the aircraft industry is at a very low state of activity, the number of advertising pages is small. Other aeronautical papers have tried to violate this fundamental publishing principle and have passed out of existence. As AVIATION desires to continue to serve its readers, it has to cut its cloth according to the existing conditions. The price of ten cents a copy as compared to twenty-five cents usually asked for aviation magazines also limits the size of the paper. So much for an explanation as to the size of the paper and the reasons for not covering more ground—or rather air.

* * * *

To go a little farther into publishing details, the increase in the circulation of AVIATION during the last year without any effort on the publisher's part is most encouraging. Today AVIATION has a larger circle of readers than at any time since the War. Each week brings additional names of subscribers. The average person thinks that larger circulation means greater revenue to a publication. This unfortunately is not the case. If the advertising revenue could be increased thereby, it would result in gains, but when there is little advertising it does not work that way. AVIATION, as a matter of fact, has all the distribution that is necessary. Its readers are receiving a paper that costs more to publish than the price they pay for it. What is wanted is to get those readers who buy the paper occasionally on the newsstands to obtain it regularly by subscription. The reason for this is not to our interest. Considering the thousands of newsstands in existence, it is naturally impossible for a trade paper to be on sale on more than a few of the leading stands. As we do not accept the return of copies that are unsold, the newsdealer usually orders a few copies less than his actual demand would warrant, so that no copies will be left on his hands. In this way many persons are disappointed each week. We cannot be criticised for not sending out papers that are not likely to be sold, paying the postage both ways. This has been tried by inexperienced aeronautical publishers, with invariable losses as a result. The only way to avoid missing special features is to subscribe, so that the paper will be received regularly. We are always glad to change addresses as often as necessary.

* * * *

The next few months will be full of interest to the aviation world. The attitude of the Navy toward aeronautics is going to be clarified by the report of the General Board that is meeting at the direction of the President. When this report is made public, it will be apparent as to whether the "backbone" nature of battleships has undergone any modification or at least whether the Navy intends to develop its air arm wholeheartedly or merely as a necessary newcomer to its ever increasing troubles. Then the Lampert Committee will make its report on the Air Services of the Government. The results of this investigation can be of the greatest value if they are made constructive and suggestive. From all indications this is the intention of those in charge of the investigation. The hearings of the Appropriations Committees always brings out many new facts. This year the main interest appears to be in the total yearly costs of aviation to the government, with the resulting inquiry as to what the public is getting for its money. It is a difficult problem and the answer will be of the greatest interest.

* * * *

AVIATION appreciates the many letters it has received commending its action in getting Charles Grey, editor of *The Aeroplane* of London, to come to this country and give our readers his views on American aviation. The results of his forceful as well as amusing articles have been gratifying. Everywhere there seems to be a feeling that the comments of an informed visitor have helped us see ourselves in a new light. Some of the comparisons that have been made between American and British aeronautics will have to be revised. We are glad to say that Mr. Grey has sent two more articles on his impressions that will appear in early issues.—L.D.G.

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INDEX TO ADVERTISERS

The World's Flying Records

Airplanes

3 Kilometers—266.59 m.p.h. Nov. 4, 1923, Lt. A. J. Williams, U.S.N., ***Curtiss-Navy Racer and Curtiss D12A Engine***

Max. Duration—36 hrs. 4 min. 34 sec. April 16, 1917, Lt. O. G. Kelly and Lt. J. A. Macready, U.S.A.

100 Kilometers—243.81 m.p.h. Oct. 6, 1923, Lt. A. J. Williams, U.S.N., ***Curtiss-Navy Racer and Curtiss D12A Engine***

Altitude with Light Load—36,555 feet October 30, 1923, by Sadi Lecointe, Issy-Les-Molineau, France

200 Kilometers Triangular Course—243.67 m.p.h. October 6, 1923, Lt. A. J. Williams, U.S.N., ***Curtiss-Navy Racer and Curtiss D12A Engine***

Seaplanes

200 Kilometers Triangular Course—177.29 m.p.h. October 25, 1924, Lt. R. A. Ofstie, U.S.N., ***Curtiss-Navy Racer and Curtiss D12A Engine***

Altitude with Light Load—29,462 Feet March 11, 1923, Sadi Lecointe, Meulan, Seine-Oise, France

100 Kilometers—176.82 m.p.h. Oct. 25, 1924, Lt. R. A. Ofstie, U.S.N., ***Curtiss-Navy Racer and Curtiss D12A Engine***

Max. Duration—20 hrs. 28 min. Oct. 10, 1924, Lts. Wead and Price, U.S.N., ***Curtiss CS2 Seaplane***

3 Kilometers—189.66 m.p.h. Oct. 25, 1924, Lt. G. Cuddihy, U.S.N., ***Curtiss-Navy Racer and Curtiss D12A Engine***

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